

# ROADS AND STREETS

OCTOBER 1949

## TWO MORE IMPORTANT TUNNEL PROJECTS DRIVEN WITH **TIMKEN®** ROCK BITS



America's smoothest drill team. Left: Multi-use Threaded Timken Rock Bit. Right: Carbide Insert Threaded Timken Rock Bit. Center: Shouldered and Threaded Timken Steel. Both bits interchangeable on the same threaded steel.

In December, 1947, Perini, Maney, Walsh & Rugo construction companies, Boston, Mass., were awarded a \$9,530,000 contract for the construction of approximately 5 miles of 12-foot finished water tunnel by the Boston Metropolitan District Commission. When completed, this tunnel will have capacity to carry 200,000,000 gallons of water daily into the Boston Metropolitan Area.

Timken carbide insert rock bits were used in excavating 200,000 cubic yards of tunnel rock and the contractors expressed complete satisfaction with their performance and economy.

In August 1948, the same contractors were awarded a contract for the construction of the Squirrel Hill vehicular tunnel, Pittsburgh, Pa. This job involved the driving of twin 36' x 26½' horse-shoe tunnels 4,200' long. Timken standard steel bits were selected in this case to provide the lowest cost per foot of hole in excavating 250,000 cubic yards of rock.

The same drill rods — threaded and shouldered — were used for both the carbide insert and standard steel bits. This gave the contractors great flexibility in using the most suitable type of Timken bit for any rock condition encountered.

We have the bits, know-how and experience; you have the rock. Get them together for utmost saving of time and cost.



**TIMKEN**  
TRADE-MARK REG. U. S. PAT. OFF.  
**ROCK BITS**

# Why Gamble Your Winter Safety

by using makeshift equipment that is slow,  
hard to control, inadequate for the job?

## For Fast High-Capacity, Unfailing Snow Removal

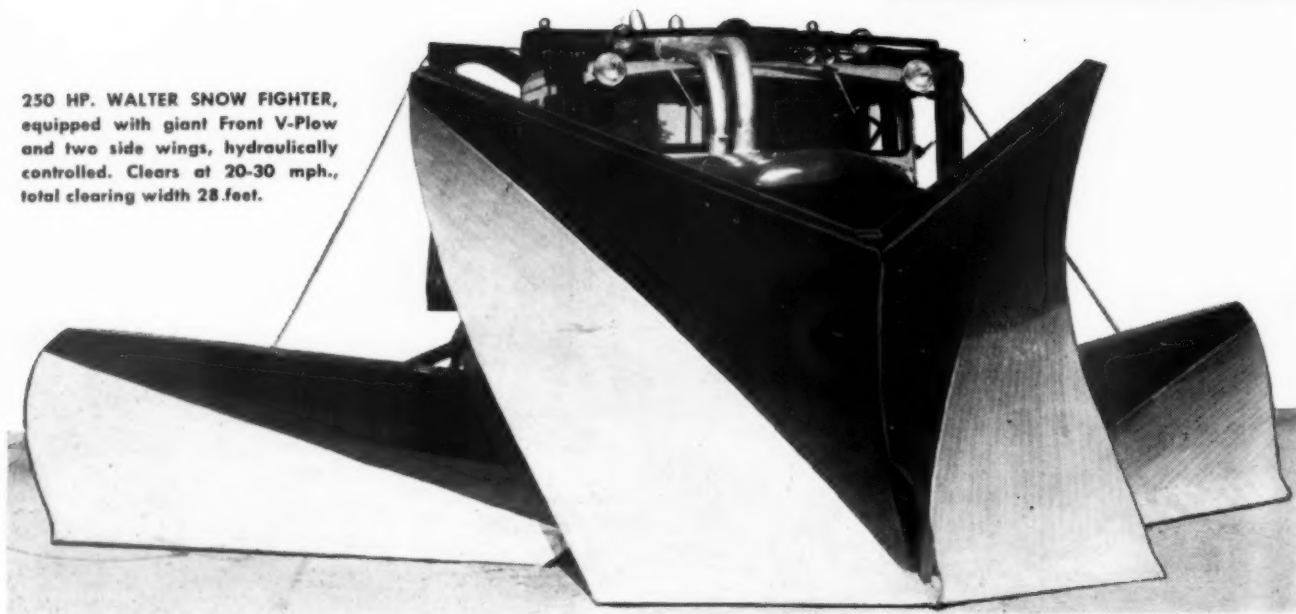
*no equipment approaches specially-designed*

# WALTER

4-POINT POSITIVE DRIVE

## SNOW FIGHTERS

250 HP. WALTER SNOW FIGHTER,  
equipped with giant Front V-Plow  
and two side wings, hydraulically  
controlled. Clears at 20-30 mph.,  
total clearing width 28 feet.



THE way to judge modern, efficient snow fighting equipment is in speed of plowing—miles covered per hour—control of direction with plows and wings—ability to widen and cut down snowbanks—power to blast through drifts—rugged reserve to keep going day and night, until the job is done. Obviously, auxiliary equipment designed for other purposes, falls far short of these requirements.

In contrast—big, powerful, rugged Walter Snow Fighters are specially designed in every detail for efficient, speedy snow removal and ice control. They clear at 20-30 mph., are powered from 150 to 250 hp., provide up

to 42,000 lb. gvwt., may be equipped with a great variety of correctly designed plows, wings, scrapers, controls, bodies, sand and chemical spreaders, etc.

Only Walter Snow Fighters bring you the vital Four-Point Positive Drive to maintain 100% traction and keep going when other equipment is stalled. Only Walters have the special construction to stand up for years in the most gruelling operation. Only Walters are built on 30 years' specialized experience with every conceivable problem of snow removal. Have our dealer show you the latest Walter Snow Fighters. Let our engineers help you with your problems.

### Record Snow Clearance is "old stuff" to Walter Snow Fighters

As far back as 20 years ago, the Grayhound Bus Lines used a fleet of 11 Walter Snow Fighters to keep 4,000 miles of highway open during a severe blizzard in the worst snow belt of the Great Lakes area. In this several day period, the longest tie-up of any stretch of road, was 36 hours! And it was done with the old-time Walter Snow Fighters—fore-runners to today's big, powerful units.

**WALTER MOTOR TRUCK CO.**

1001-19 Irving Ave.  
Ridgewood 27, Queens, L. I., N. Y.



# New Elevated Highway *IN MANHATTAN*



Looking over the day's work. Left to right: J. Kinney, superintendent, and J. Tiernan, vice-president, P. T. Cox Construction Co., Inc.; W. Lewis, assistant superintendent, E. Happ, assistant section engineer, J. Mancini, section engineer, and G. Tuscher, inspector, all for City of New York.



↑ Easy does it! Bethlehem girder goes into place on north ramp. Heaviest girder on job weighed 90 tons. (At top) Air view, looking north, showing cars on completed roadway. Elevated portion of Franklin D. Roosevelt Drive is 2717 ft long. Skyscrapers of midtown New York visible in distance.



Cars roll on old highway as Bethlehem H-piles are driven to bed rock. Part of Stuyvesant Town and Peter Cooper Village in background.



Finished roadway starts to take shape as initial layer of concrete is poured over heavy concentration of Bethlehem Reinforcing Bars.

Construction of Stuyvesant Town and Peter Cooper Village, gigantic housing developments adjacent to the East River in downtown Manhattan, posed a serious traffic problem. To enable pedestrians to reach the river front in safety, as well as to provide a non-stop route for motorists using the Franklin D. Roosevelt Drive, the city recently authorized elevation of this heavily-traveled thoroughfare from 15th St. to 25th St. Construction of the four-lane elevated highway was handled by P. T. Cox Construction Co., Inc., and P. J. Carlin Construction Co., both of New York. Bethlehem fabricated and erected the structure, and also furnished H-piles and reinforcing bars.

## BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation

## STEEL FOR HIGHWAYS

Dowel Units • Reinforcing Bars • Guard Rail Posts  
Bar Mats • Guard Rail • Wire Rope and Strand  
Hollow Drill Steel • Spikes • Bolts and Nuts • Pipe  
Sheet- and H-Piling • Fabricated Structural Steel  
Timber Bridge Hardware • Tie-Rods



# ROADS AND STREETS

October, 1949 • Vol. 92 • No. 10

With Roads and Streets Have Been Combined Good  
Roads Magazine and Engineering & Contracting

E. S. GILLETTE, Publisher



HALBERT P. GILLETTE, Editor-in-Chief

## Coming Articles

### 560,000 C.Y. Swamp Fill

#### Built with Modern Scraper Fleet

How Nello L. Teer Company tackled an unusual earthmoving job on the Annapolis-Washington Parkway, using pans, loader-and-wagons, dozers and dynamite to achieve 300,000-yd. monthly pace.

### Rock and More Rock

Several articles on rock excavation will appear in November or December R and S.

### Street Paving

Resurfacing methods and problems will be covered in articles on programs at Baltimore, Kansas City, New York City, and one other city soon.

### Soils Engineering

Where do we stand in triaxial testing and flexible base design? Developments in thinking in one leading state highway department, with sample road designs, will be presented in a series of articles by a well-known soils engineer.

### Selecting and Managing Your Shovel-Wagon-Truck Outfit

We hope soon to present an invaluable analysis of this \$64 (thousand and then some) problem.

### Airport Projects

A sand-asphalt runway job in the South . . . An extension project in the West . . . How three concrete paving contractors raced each other at Detroit-Wayne airport.

### Pennsylvania Turnpike Extension

The R and S editors will report progress soon, with some unusual pictures. The Turnpike, as you may know, is being extended 99 miles eastward into Philadelphia, and the contractors are out to beat the spectacular pace they set in '39.

### "Knockin' Out the Yardage"

Under this new popular department in R and S you'll be reading what the fastest-moving contractor outfits achieved this year. Why not send us the facts about your project?

Contractors and the superintendents . . . officials and engineers . . . something for all in each issue of "Roads and Streets". Watch for your next copy. Practical "how it was done" articles invited from readers.

HAROLD J. McKEEVER, Editorial Director

C. T. Murray, Managing Editor

Col. V. J. Brown, Associate Editor

S. A. Phillips, Field Editor

H. K. Glidden, Contributing Editor

P. V. Jones, Production Editor

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Gillette Publishing Company, Publication  
and Editorial Offices, 22 West Maple  
Street, Chicago 10, Ill.

Chicago Office.....H. J. Conway, Advertising Manager, 22 W. Maple St.  
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Los Angeles Office.....Don Harway, West Coast Representative,  
1709 W. 8th St.

Acceptance under Act of June 5, 1934. Authorized April 16, 1948, at Mount Morris, Illinois. Published monthly. Subscription price \$5.00 per year.

# THE 3/4-YARD LORAIN TL-25 IS HERE...

*Thew*  
**TL-25**  
*Lorain*

IT'S BIGGER...HEAVIER!

GREATER CRANE CAPACITIES!

IT'S FIELD TESTED!

EXTRA-LONG OR WIDE GAUGE CRAWLERS AVAILABLE!

IT'S THE BEST BUY IN 3/4-YD. SHOVEL-CRANES!



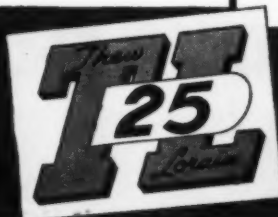
• Users asked for it! Here it is! Now, a big-producing 3/4-yd. Lorain TL-25 that gives you more of everything for your money! More output—with the big-producing 3/4-yd. dipper! More weight—and greater crane capacities. This new addition to the Lorain line brings you the most modern machine of its class...with more features for high production and long life. Here are 16 plus values in the new Lorain TL-25... (1) INTERCHANGEABLE MAJOR COMPONENTS (2) 5 IDENTICAL SHOE CLUTCHES (3) ANTI-FRICTION BEARINGS (4) OIL-ENCLOSED CUT GEARS (5) INTERCHANGEABLE PARTS (6) A ONE-PIECE TURNABLE BED (7) HOOK ROLLERS (8) STANDARD AND WIDE GAUGE CRAWLERS (9) EXTRA-LONG CRAWLERS FOR DRAGLINES (10) TWO CRAWLER SPEEDS (11) DROP FORGED TREADS (12) POSITIVE TRAVEL LOCK (13) "FULL CIRCLE" STEERING (14) POSITIVE INDEPENDENT SHOVEL CROWD (15) ALL-PURPOSE CRANE BOOM (16) GOOSENECK HOE BOOM.

Plan now to equip your next job with the stand-out 3/4-yd. Lorain TL-25...Your nearby Thew-Lorain Distributor will give you all the details!

**THE THEW SHOVEL CO., LORAIN, OHIO**



**THEW · Lorain®**



## A NEW 1/2-YD. LORAIN



### For The Smaller Jobs

The new TL-15 rounds out the "TL" series. It's a lighter 1/2-yd. version of the TL-25—with shorter tail swing and narrower crawler mounting—yet gives you the outstanding plus values of the TL-25. Here's the best 1/2-yd. buy for your money.

Get the New Lorain TL-25 and TL-15 story from your Thew-Lorain Distributor.

SHOVELS • CRANES  
DRAGLINES • HOES  
CLAMSHELLS



# A NEW ALL S



The new TD-24 offers you more horsepower than any other crawler tractor available today—180 hp. at the flywheel, 140 hp. at the drawbar—plus dozens of features found only in the new TD-24.

Your International Industrial Power Distributor is now ready to furnish you with three great new stars of earthmoving power and performance—the new TD-24, the new TD-18A and the new TD-14A.

The great new TD-24 is America's most powerful and versatile crawler tractor with unmatched features for easier operation and far greater production. No other crawler tractor can give you all the features found in the new International TD-24.

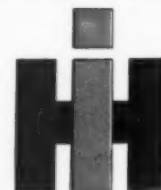
And the other two stars on the new International

**INTERNATIONAL HARVESTER COMPANY CHICAGO**



Standardize  
on Power  
that Pays

## INTERNATIONAL INDUSTRIAL POWER



INTERNATIONAL  
HARVESTER



# STAR CAST

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earthmoving team are the TD-18A and TD-14A. Known for years for their dependable performance, these two efficient tractors have had their power increased to do more work, to operate with even greater ease and economy.

See your International Industrial Power Distributor now. Find out the facts and get these new tractors to work for you. You'll have an all star cast in your earthmoving line-up.

NY CHICAGO, ILLINOIS

## THE NEW TD-14A

The new TD-14A has 60 drawbar horsepower and many mechanical improvements. Here is power to produce bigger payloads and to cut earthmoving costs



## THE NEW TD-18A

Famous for its power and dependability, the new TD-18A now gives you 87 drawbar horsepower. All the famous International diesel engine features and the durable construction of the new International TD-18A make this tractor an even greater producer than ever before.





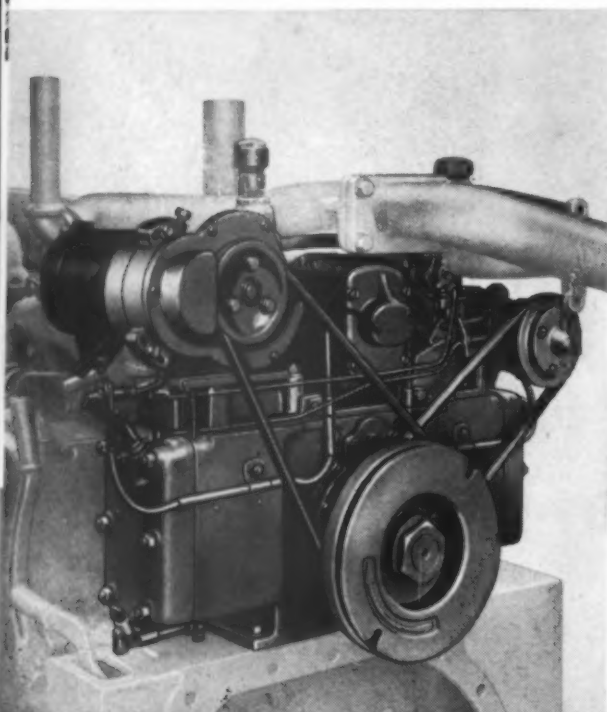
"Caterpillar" No. 12 Motor Grader with V-plow and snow wing on heavy snow removal in the Black Hills National Forest. Says Ray Smith, Highway Engineer, "Our Motor Graders have been operating almost continuously throughout the snow season, without any sort of breakdown."



"Caterpillar" No. 212 Motor Grader clearing snow from Cass Lake, Minnesota, street. Equipped with matching "Caterpillar" Bulldozer blade that can be used for one-waying snow and clean-up. (Can be angled to either side.) Used for road maintenance and other jobs in summer.

# Sure-shot Blizzard Busters

**Sure starts in coldest weather.** This independent gasoline starting engine on "Caterpillar" Motor Graders and Tractors is started electrically from a 6-volt battery. (Or, it can be easily hand-started.) It enables you to condition the Diesel engine as long as necessary—warming the water, circulating the oil, and turning the engine over under compression. It's sure-fire!—even below zero.



**T**ODAY everybody thinks of doing big snow-removal or earth-moving jobs with Diesel power. And "Caterpillar" Diesel Tractors and Motor Graders have special advantages for your year-round highway jobs—whether you are doing work in January or July. They are amply armed for the added task of combating cold and other winter operating conditions with these features:

1. An independent gasoline engine for quickly and safely starting the Diesel engine at low temperatures.
2. Dependable thermostatic controls that keep engine and lubricating oil at proper temperature for top efficiency.
3. A fuel system that doesn't foul or clog under severe operating conditions.
4. Mechanical power controls that are not affected by cold.
5. Wide, deep-grousered tracks on the Tractors, for sure-gripping traction even in soft snow.
6. Four-wheel tandem drive on the Motor Graders, to put the entire weight of the engine over the driving wheels for maximum traction.
7. Front wheels on the Motor Grader that can be leaned either way to keep plow heading into the work when one-waying snow.

These and many other distinctive features and qualities make "Caterpillar" machines easy to start, easy to handle, sturdy, powerful—and capable of non-stop going twenty-four hours a day. Operating costs? Rock bottom. Let your "Caterpillar" dealer give you the facts based on thousands of actual field records. Meantime, use the coupon. No obligation.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

Caterpillar"   
 motored and   
 the State of

indispensable as   
 a Minnesota   
 with Traxcav

ENGINE   
 MOT   
 EARTHMO





"Caterpillar" D6 Tractor with No. 6S Bulldozer clearing snow off rock-strewn and rock-sided mountain highway. The equipment is owned by the State of Oregon.



"Caterpillar" No. 12 Motor Grader with blade and snow wing clearing snow on logging roads of the Biles Coleman Lumber Company, near Disautel, Washington. Covers approximately 25 miles per day.



Indispensable assistant to plow and blade equipment is this loading unit in a Minnesota haul-away snow removal job—a "Caterpillar" D4 Tractor with Truxcavator. "A very fine combination," says Andrew Heggstad.



"Caterpillar" D7 Tractor equipped with Balderson V-type snow plow, operating near Springfield, South Dakota, where the winter's 61 inches of snowfall necessitated opening and reopening roads several times.

# CATERPILLAR

REG. U. S. PAT. OFF.

## DIESEL

ENGINES • TRACTORS

MOTOR GRADERS

EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO., Dept. RS-10, Peoria, Illinois

Send me your latest booklet, "Bucking Snow Costs."

Name \_\_\_\_\_

Address \_\_\_\_\_

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*Why take less  
for your money?*

**You need both-**

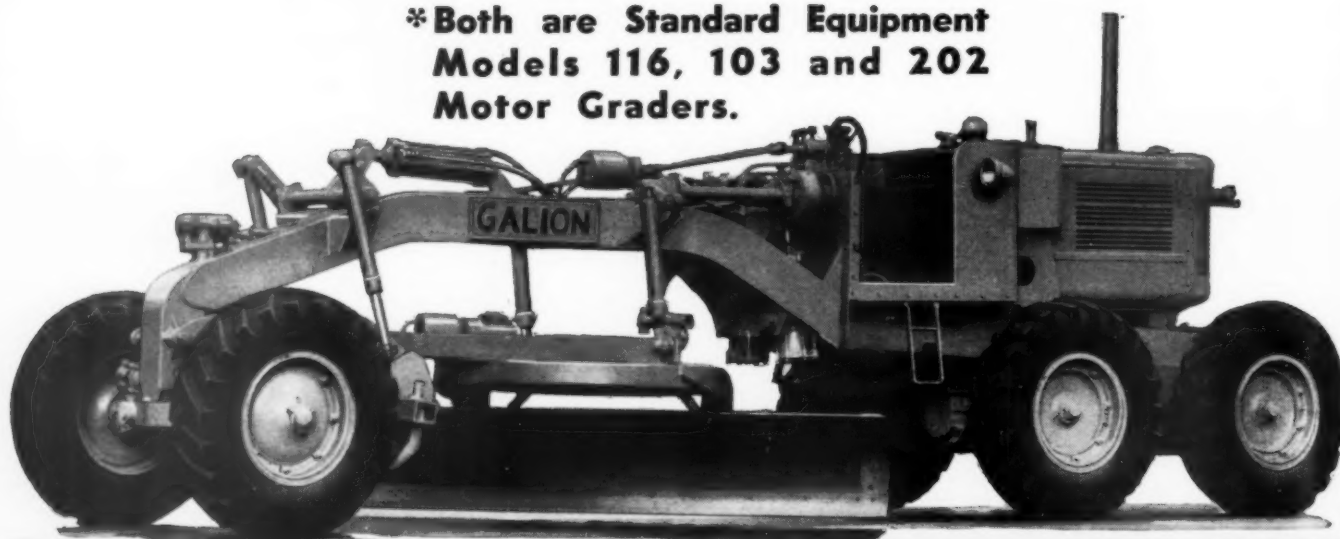
\*

**LARGE  
FRONT  
TIRES**

\*

**HYDRAULIC  
BOOSTER  
STEERING**

**\*Both are Standard Equipment  
Models 116, 103 and 202  
Motor Graders.**



**SAME SIZE TIRES FRONT AND REAR**

THE GALION IRON WORKS & MFG. CO., General and Export Offices — Galion, Ohio, U. S. A  
Cable address: GALIONIRON, Galion, Ohio



When the going is the toughest you really need that confident — **"FEEL OF HAND STEERING"** while the hydraulic power is doing the **"BIG MUSCLE"** part of the steering job —

Ask any operator who is using a new GALION. Then ask yourself —

*Why take less  
for your money!*

**GALION**

**HYDRAULIC BOOSTER STEERING  
MOTOR GRADERS**

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Galion, Ohio, U S A



# OPERATION WINTER



This winter, keep traffic moving with TRAXCAVATORS. Their smooth action and handling ease is a real time-saving combination when there's snow, slush or ice to be removed. TRAXCAVATORS plow the snow to one side, scoop it up, load it into trucks or carry it to a disposal point.

See your TRACKSON-Caterpillar dealer for full information, or write direct to TRACKSON COMPANY, Dept. RS109, Milwaukee 1, Wisconsin.

But snow removal is only *one* of the many jobs TRAXCAVATORS do. They are also kept busy on sanitary land fill, building and maintaining roads and streets, handling bulk materials and doing many other jobs of digging, loading or grading.

## TRAXCAVATOR

REG. U. S. PAT. OFF.

*The Original Tractor Excavator*

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# McCulloch presents THE SAWING SENSATION OF THE YEAR

- ★ 3 hp McCulloch die-cast gasoline engine
- ★ Less than 25 lbs. complete with 18" blade and chain
- ★ Pistol grip handle, trigger type throttle
- ★ All engine controls grouped for one-hand operation
- ★ Automatic Clutch stops chain when engine idles
- ★ Kickproof automatic rewind starter
- ★ Ignition points accessible for easy adjustment
- ★ Floatless carburetor permits sawing in any position
- ★ Built-in chain oiler



**THERE'S A McCULLOCH CHAIN SAW  
for every wood-cutting purpose**

**MODEL 3-25** ★ 18-inch blade—\$295.00  
24-inch blade—\$305.00 • 12-inch bow — \$315.00

**MODEL 5-49** ★ 5 hp high production series  
available with 20, 30, 40, 50, 60-inch blades  
and with 20-inch bow.



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CORPORATION**

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NATIONWIDE SALES AND SERVICE



## A 25-POUND ONE-MAN WONDER

Every outstanding feature of the larger McCulloch Chain Saws is in the new, *truly one-man*, Model 3-25. Besides, all the experience gained in building the others has been carefully embodied in this great new chain saw achievement. The Model 3-25 answers the long standing demand for the *lightest possible* unit combined with dependability and high performance.

Check the features—see the Model 3-25 now on display—give it every test in the book, and you'll agree that it's your winning number.

## SEND COUPON FOR NEW DATA SHEET AND COMPLETE SPECIFICATIONS

McCULLOCH MOTORS CORPORATION  
6101 West Century Blvd., Los Angeles 45, Calif.

Please send me immediately information on the NEW Model 3-25 McCulloch chain saw and name of nearest dealer.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# STEP UP YOUR MIXER OUTPUT... P

## with KWIK-MIX

11-S Dandie, illustrated, is a 2-wheel, end-discharge non-tilter . . . also available as a 4-wheel mixer with side or end discharge. Note tilted Flow-Line chute for faster discharge of each batch.



**O**N EVERY type of mixing job — concrete, bituminous or plaster-mortar — you can get bigger production, more profit for your labor and materials costs with Kwik-Mix mixers. Here are a few reasons why:

Through the double-mixing action of Kwik-Mix Dandie, you get perfect texture concrete at no increase in batching time or cost. Exclusive Flow-Line discharge chute reaches deep into drum . . . discharges each batch fast. Four Dandie sizes range from 3½ to 16 cu. ft. capacities, with wide choice of side or end discharge types.

For biggest production per man-hour on your bituminous

work, it will pay you to check the 10 and 14 cu. ft. Kwik-Mix bituminous models . . . easy loading . . . accurate, thorough mixing . . . fast discharging. For your plaster work, there are 6 and 10 cu. ft. Plaster-Mortar mixers that easily keep ahead of the fastest men on any job.

Every model in the big Kwik-Mix line has silent, smooth-running "V"-belt drive . . . easily adjustable, accessible . . . delivers steady, trouble-free production. Whatever your mixer requirements, you'll find Kwik-Mix the lowest cost answer. Call your local Kwik-Mix distributor for complete facts . . . or write TODAY.



**3-1/2-S**

Dandie; side or end discharge; tilting or non-tilting. Sturdy . . . light weight . . . portable.



**6-S**

Dandie; end discharge; non-tilting. Also shown is 4 h. p. Moto-Bug — a versatile power wheelbarrow.



**BITUMINOUS** mixers; 10 and 14 cu. ft.; non-tilting; 4-wheel; also ideal as high production stationary plant. 10 cu. ft. model shown.

Send to: KWIK-MIX CO., Dept. CE, Port Washington, Wis.

Please mail bulletins on: Dandie\* Mixers ☐ 3½-S ☐ 6-S ☐ 11-S ☐ 16-S

Bituminous Mixers ☐ No. 10 ☐ No. 14 Plaster-Mortar Mixers ☐ 6-P ☐ 10-P

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

☐ Also send facts on new 4 h. p., 10 cu. ft. Moto Bug power wheelbarrow.

# KWIK

Port Washington, Wis.  
(Koehring Subsidiary)

## NEW T Kwik-

Now you  
to forms  
into trucks  
Loader att  
Dandie mi  
height. Bi  
is raised  
matically v  
Mixer engi  
lever opera  
you the ti  
mixer instal

**PLASTER-MORTAR**  
second discharge  
plasterers. 10 cu

# -M COM



# PROFITS



## NEW TOWER LOADER for Kwik-Mix 11-S and 16-S

Now you can discharge concrete batches to forms above ground level, or direct into trucks with handy Kwik-Mix Tower Loader attachment. Fits 11-S and 16-S Dandie mixers . . . discharges at 9'2" height. Big bucket holds full batch . . . is raised by power . . . dumps automatically when it reaches top of tower. Mixer engine supplies the power. Single-lever operated from mixer platform. Saves you the time and cost of overhead mixer installations on many jobs.



PLASTER-MORTAR mixers; 6 cu. ft.; non-tilt; 7-second discharge; efficiently serves 1 to 30 plasterers. 10 cu. ft. size also available.

# -MIX

COMPANY



## 18.5 m.p.h. utility-size TRENCHMOBILE\*

Rubber-tired, one-man Trenchmobile makes quick work of small trenching jobs, off-street connections, etc. Travels fast at road speeds to 18.5 m.p.h. over city streets and highways. No waiting for trailers. Works fast . . . digs up to 13.22 ft. per min., 4 ft. deep, 5" and 7½" wide. See your Parsons distributor or write direct to us for fact packed Trenchmobile bulletin.



## PARSONS COMPANY

Newton, Iowa  
(Koehring Subsidiary)

## Big-Storage LO-BIN TROLLEY BATCHER

For big storage capacity and exceptionally low charging height, here's Johnson Lo-Bin Trolley Batcher. 7½ ft. high, holds 8 tons. With flared top extension panels, it's only 9½ ft. high, 10'9" overall and has 30 ton capacity. Easily charged by front-end tractor loader. Efficiently serves 6-S, 11-S and 16-S mixers. Check your Johnson distributor . . . or write for catalog.



## C. S. JOHNSON COMPANY

Champaign, Illinois  
(Koehring Subsidiary)

## Koehring 205 handles 7-3/4 to 10-ton lifts

As a lift crane, Koehring heavy-duty 205 safely handles 7¾ to 10-ton loads, depending on type of mounting. Available on crawlers or rubber-tires. Its fast line speeds also give you big production on clamshell or dragline work. Readily converts to ½-yard shovel or hoe. See your local Koehring distributor . . . or get complete story in big 28-page catalog . . . write TODAY.



## KOEHRING COMPANY

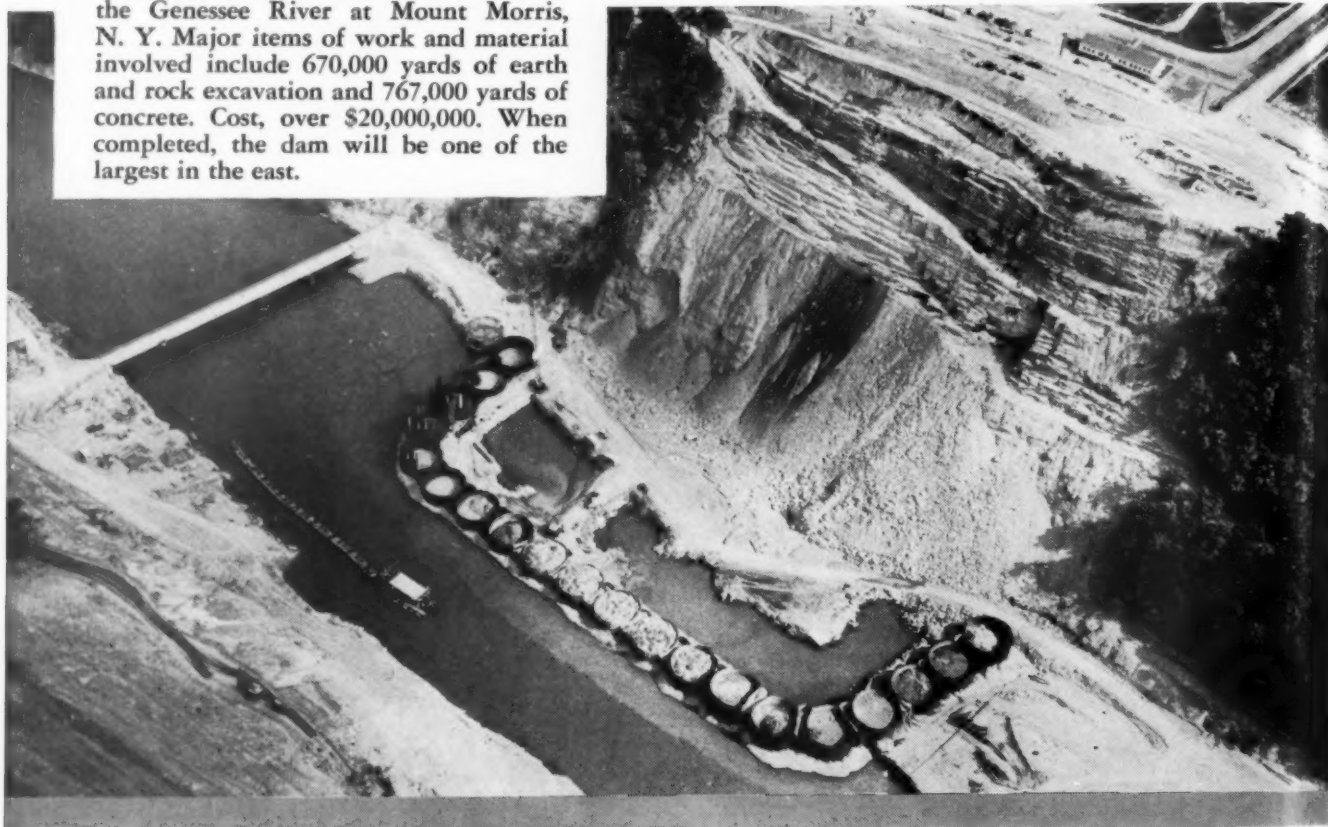
Milwaukee 10, Wis.

# GULF QUALITY LUBRICANTS and FUELS

## help keep equipment *on the job*

### at Mount Morris

Mount Morris Dam Builders, Inc., consisting of 5 leading contractors, is constructing the huge Mount Morris Dam on the Genesee River at Mount Morris, N. Y. Major items of work and material involved include 670,000 yards of earth and rock excavation and 767,000 yards of concrete. Cost, over \$20,000,000. When completed, the dam will be one of the largest in the east.



Photograph through the courtesy of Fred H. Powers, Democrat-Chronicle, Rochester, N. Y.

The Mount Morris Dam is a big construction project. It's the kind of job on which the contractors are not likely to take chances with their equipment. They want sure protection and efficient power to insure top performance and prevent costly mechanical delays.

That's why Mount Morris Dam Builders, Inc. selected Gulf Quality Lubricants and Fuels—on the basis of experience and reputation. And they are getting the kind of lubrication and fuel performance that is required to complete the job on schedule.

Write, wire, or phone your nearest Gulf office today and arrange to use Gulf Quality Lubricants

and Fuels on your next job. They are quickly available to you through 1200 warehouses in 30 states from Maine to New Mexico.

**Gulf Oil Corporation • Gulf Refining Company**

*Division Sales Offices:*

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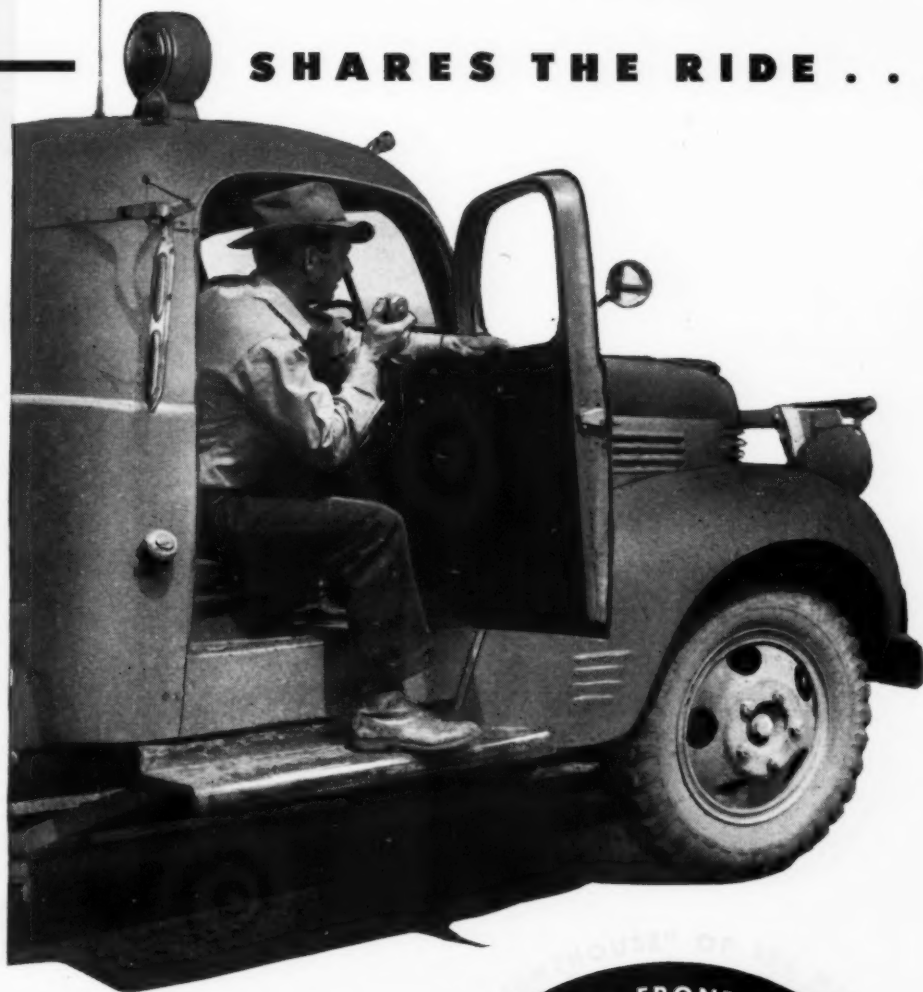
*with*

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**FLASHING**

**LIGHTS**

**INSTALLED**



**SHARES THE RIDE . . .**

Make your streets and highways safer by equipping all your vehicles with Keystone Flashing Lights. They flash 80 "STOP" warnings per minute both to front and rear—two ways at once. Completely visible through swirling snow. Act as "lighthouses" to promote highway safety.

Used for over 12 years by nearly all state highway departments and by countless cities, counties, townships, park and bridge commissions, public utilities, etc. Take one apart to learn why—write for sample light.

*Auto Gear & Parts Co., Inc.*

16th St. & Hunting Park Ave. • Philadelphia 40, Pa.



**KEYSTONE**

**LIGHT**

Heavy-duty lights that won't shake apart. Water can't get in and short them. Mounted anywhere on vehicle. Supplied with 6½ inch red lenses lettered "STOP" or with plain red, amber or blue lenses for 6 and 12 volt systems.







## ... a straight line is the economical distance between two points!

The straight-line operation of an Oliver "Cletrac" tractor and Sargent Overhead Shovel will cut your costs . . . *plenty!* Here's why!

This unit crowds *directly* back in digging or loading . . . moves *directly* forward to load out trucks. The shovel arms swing *directly* over the tractor. Contrast this fast action to ordinary loaders where the tractor must crowd into the pile . . . back out . . . turn

around and travel to truck or dumping pile. Easy to see why jobs move so much faster . . . why you can really cut costs!

And, the Basic Overhead unit can be quickly and economically converted to a Backhoe, Bulldozer, Pipe Handler, or Log Loader . . . a complete crew at a fraction of the cost of combined individual units.

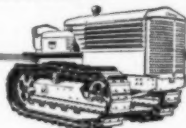
Your Oliver "Cletrac" Distributor will be glad to give the complete, cost-cutting story.

**Cletrac**

a product of

**THE OLIVER CORPORATION**

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio  
A complete line of crawler and industrial wheel tractors



"THE SIGN OF  
EXTRA SERVICE"

★★★★

PRTD. IN U. S. A.

# Barber-Greene

B-G COST-SAVING BULLETIN No. 4906

★★★★

145M-AM-8-49

## B-G PERFORMANCE PAYS DIVIDENDS TO USERS IN MATERIAL HANDLING, ASPHALT CONSTRUCTION AND DITCHING



B-G Conveyors operated by McGrath Sand and Gravel Co., to maintain a 15,000 ton surge stock pile at their Pekin, Ill., plant.

### "B-G CONVEYORS ARE REALLY ENGINEERED"

Pekin, Ill.: Impressive evidence of the adaptability and flexibility of B-G Permanent Conveyors is presented in the local plant owned by the McGrath Sand and Gravel Co. Of their two standard "off the shelf" B-G Conveyors already operating—and a third, which is gradually replacing a twenty-year-old structure—R. H. Ashley, Superintendent, has this to say: "We like them; they are easy to erect, and fit into our operations nicely. They even look good—as if they have been engineered for the job."

At the Pekin plant, river sand is excavated by dredge and delivered to a crusher. Here a B-G Conveyor takes the material skyward in a spectacular rise to a discharge point in the center of an overhead bridge structure. (See photo at left.) This bridge permits the building of a 15,000 ton surge stock pile which makes dredging and plant operations independent of each other.

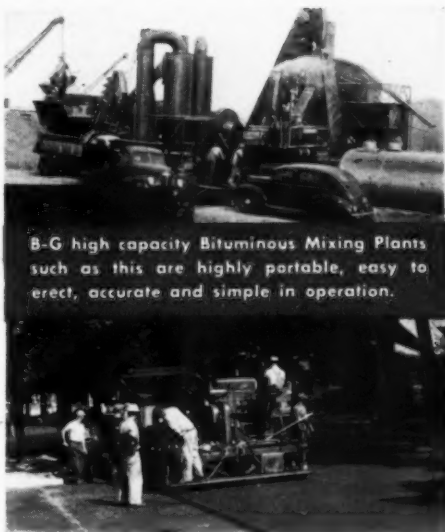
A tunnel conveyor underneath the pile carries material to a wood frame conveyor—being replaced a span at a time by B-G Conveyor sections—leading to the main plant.

## Concrete Resurfacing "Big Business" for Owners of B-G Asphalt Equipment

Abilene, Kan.: Typical of the many contractors who have been keeping their B-G Asphalt Equipment profitably busy on resurfacing jobs, the Reno Construction Co. of Kansas has recently completed a project between Abilene and Chapman on U. S. Route 40.

This important highway—18 feet wide and most of it around twenty-five years old—had disintegrated to the point where further maintenance was not justified. The contractor removed those areas which were beyond salvage, repaired or replaced the base material and relaid the concrete slab. A 24-inch bituminous concrete extension was laid on either side, and then the Barber-Greene went to work.

Reno Construction Company's B-G 848 high-capacity Asphalt Plant—with Gradation Unit, Dryer and Dust Collector—produced 100 tons of asphalt cement mix, hour after hour.



B-G high capacity Bituminous Mixing Plants such as this are highly portable, easy to erect, accurate and simple in operation.

B-G Tamping-leveling Finisher lays a smooth, level surface regardless of variations in the sub-grade.

### Runabout Ditcher "Does Work of Three Crawler Machines"



A large southern gas, light and water company reports that its B-G Runabout Ditcher has proved itself the "equal of three crawler-mounted machines in daily output." This pneumatic-tired ditcher is highly portable, travels under its own power. The company further reports, "the Runabout is ideal for laying small mains and services . . . in installing services across a black top street we allow traffic to cross the ditch without the aid of planks or bridges, since the ditch is only 6 inches wide."



B-G 92 Car Unloader with 661 Gooseneck Conveyor.

### "A Pleasure to Recommend B-G Equipment"

Asheville, N. C.: After Community Coal and Lumber Co. changed from hand unloading to mechanized B-G unloading of coal from railroad cars, their man-hour requirements were cut 66% while capacity of cars handled was doubled. With a B-G 92 Car Unloader and 661 Gooseneck Conveyor, one man now does the whole job. J. E. Divelbiss, Jr. of the Company further states, "We have been highly pleased with B-G Equipment—had very low maintenance. It is a pleasure to recommend Barber-Greene to anyone in this business."



## B-G BUCKET LOADER PAYS FOR ITSELF SEVERAL TIMES OVER



B-G Model 522 Swivel Conveyor Bucket Loader operated by William Schwante & Sons, Chicago.

### Cuts Man-Hours, Speeds Up Loading for this Material Yard

Chicago, Ill.: Since 1946, when purchased by William Schwante & Sons, a B-G 522 Swivel Conveyor Bucket Loader has paid for itself many times over by its savings in manpower alone. Further, in loading sand, gravel, stone and stoker coal at full capacity, the 522 has cut truck time to the bone—and its versatility, speed and portability have made it one of the most valuable machines in the yard. As Mr. Schwante puts it, "I can load a truck of stoker coal in practically nothing flat." He goes on to say that in the past three years repairs on his B-G 522 have been "next to nothing." Here again the widely useful pneumatic-tired 522 Loader proves that you can't beat B-G mechanized loading of free-flowing material.

Johnstown, N. Y.: By adapting their B-G 522 Bucket Loader to snow handling (with the B-G low cost snow flight line) the city of Johnstown, New York, has gained year-round use of their loader. In summer, sand and stone for paving operations are loaded. For winter service, the change is made and the loader clears windrowed snow from the city streets—loading a truck in a few minutes where before 4 to 6 men took half an hour for the same job.

"Big Brother" to the B-G 522 Loader, the 545A is a heavy-duty 3 cubic yard per minute, self-propelled machine.



At top capacity, stoker coal is reclaimed to truck with a B-G 672 Coal Loader at Fidelity Mines' radial layout.

## B-G Radial Layout Speeds Truck Loading at Illinois Strip Mine

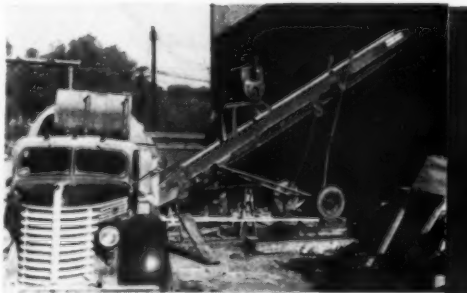
DuQuoin, Illinois: At the Fidelity Mine of the United Electric Coal Co., near DuQuoin, Ill., a completely equipped Barber-Greene radial coal handling layout with car unloader, stacker-conveyor and two self-propelled reclaiming coal loaders has considerably speeded up truck loading operations.

Once sized, cleaned and classified, the coal is delivered to the radial installation in hopper bottom cars. There it is unloaded with a B-G Model 93 pit car unloader and a radial-mounted, swivel wheel B-G flight type stacker conveyor.

Reclaiming into trucks of various sizes is done with either a Barber-Greene Model 672 cleated belt conveyor or a B-G power propelled Model 661 "Gooseneck" flight conveyor. Although nominally rated at 2 tons per minute, the 672, when loading stoker coal into large semi-trailer trucks, consistently handles up to 3 tons per minute. For larger sizes of lump coal, the "Gooseneck" 661 is employed, with its adjustable discharge permitting low drop into truck, preventing costly breakage.

The widely used, well-integrated B-G radial layout is proving itself an important time and labor saver when truck distribution of coal is desirable.

## USERS FIND LOWEST COST WAY TO DO MANY JOBS IS WITH B-G PORTABLE CONVEYORS



B-G Portable conveyor delivering concrete to second floor from transit mixers.

### Speeds Concrete Placement

Alton, Ill.: Pouring concrete seats for a stadium, pouring walls and recently, pouring the second floor on a factory remodeling job—this is the class of work that has been turned over to a B-G Portable Conveyor by R&R Construction Company. On this latter job, the conveyor operated at a 30° incline, was started and stopped frequently with a full load on the belt without stalling. On job after job the versatile Barber-Greene has eliminated the need for a concrete elevator and has saved many dollars in time and labor in getting concrete into the forms.



A B-G Belt Car Unloader, Portable Conveyor and Bucket Loader team up on this job.

### Eliminate Truck Crane

Winnetka, Ill.: Unloading hopper-bottom cars of sand and gravel with a rented truck crane is an unsatisfactory operation—too costly, too slow—as discovered by Weissenberg Fuel Company of this town. With the purchase of a B-G 358 non-slip chain and belt car unloader and a B-G Portable Conveyor the company eliminated this expensive practice. This B-G team now unloads material in half the time and conveys it swiftly to the stock piles. It's a one-man operation—no high truck crane rental.

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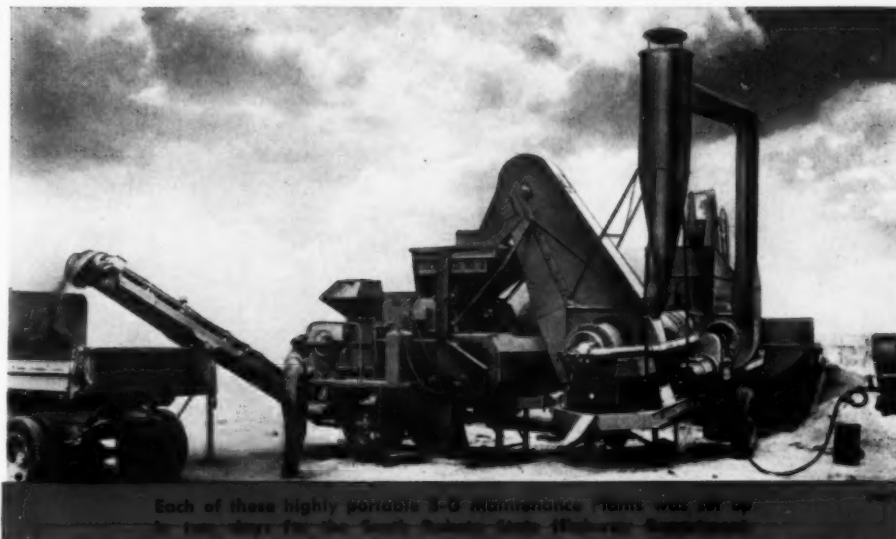
# THREE PLANTS MAKE POSSIBLE YEAR 'ROUND MAINTENANCE OF SOUTH DAKOTA ROADS

## Operate Efficiently in Freezing Weather

Pierre, S. D.: Three B-G Maintenance Asphalt Plants are solving the problem of early spring road repair for the State Highway Department. Until now, early work has been seriously hampered by frequent freezing rains that made blade mixing impossible and delayed vital spring repairs.

Delivered in December, the plants were sent to Huron, Rapid City and Aberdeen. Each was set up in less than two days despite sub-zero temperatures. The Huron and Aberdeen plants went to work at once, producing a quality mix and providing maintenance crews with all the material required to maintain roads in good condition.

All plants are used to stockpile excess material close to the plant site during slack periods for future reclaiming as needed. The slow curing qualities of the bituminous mix produced for stockpiling make it possible to anticipate summer requirements—and to keep the plants usefully and economically at work practically the year 'round.



## B-G DITCHER DIGS IN CENTER OF HIGHWAY FOR CONDUIT INSTALLATION



B-G 44C Ditcher digging 24-inch by 4-foot conduit trench on busy concrete street.

Milwaukee, Wis.: Digging a 24-inch conduit trench down the center of a concrete highway and over numerous uncharted obstructions is the latest of many impressive performances of Stone Construction Company's B-G 44C Ditcher.

Here, concrete was broken up with jackhammers and removed for a path wide enough for the ditcher boom. The B-G automatic overload release prevented damage to both machine and pavement whenever, by chance, the bucket line came in contact with the concrete. Further, the ability of the B-G Vertical Boom to dig straight down, leaving no ramp, saved untold hours of hand digging: the 44C dug right up to underground obstructions.

Because the conduit was a foot or more thick, excessive backfill could have been a problem. The 44C loaded much of the material directly into trucks.



The B-G 82A Crawler-mounted Loader is a heavy duty, 3 cubic yard per minute, sure-footed machine.



The B-G Travel Plant offers lowest cost means of producing quality bituminous mixes.

## Travel Plant Has Thousands of Miles Behind and Ahead of It

The B-G Travel Plant has for many years been identified with low cost, high quality bituminous roads. At minimum cost, it produces highest quality bituminous or stabilized "mixed in place" material. Consisting of two B-G units—the 848 Mixer which is towed and supplied by a B-G Paving Bucket Loader—the Travel Plant allows economical use of local materials. It does not obstruct traffic. Requires but two operators. Accurate proportioning saves asphalt and gives a uniformly finished job.

## FAST LOADING, STRIPPING AND PICKUP WITH THIS B-G CRAWLER-MOUNTED LOADER

The husky, high capacity B-G 82A Loader has been setting records for output and versatility for years. On one job, two of these loaders excavated, screened and loaded 93,000 tons of bank-run gravel at a 1,000 tons per day clip. Another user reports 125,000 tons of sand handled by his 82A in two years with practically no repair cost. The 82A is a big high-discharge loader with all the B-G advantages—automatic overload release, floating boom, spiral feed, etc., ideal for the most severe service.

## Ditcher Solves Problem with a New Slant to It



Castle Shannon, Pa.: Alleyways too steep to be negotiated by automobiles—up to 15° slopes—were the site of a recent job done successfully by a B-G 720 Ditcher for Equitable Gas Company. Operating easily in the steep, narrow alleyways, the Barber-Greene often completed 4 or 5 blocks of such digging in half a working day—this despite numerous cross walks and extreme rocky conditions of the soil.

# SNOW OR CORAL ROCK "Barber-Greenes" CUT THE COST AND TIME REQUIRED TO MOVE IT



B-G 548A Pneumatic-tired Snow Loader. Up to 20 cu. yds. per min. 7 m.p.h. road speed.



B-G 522 Pneumatic-tired Snow Loader 5 cu. yds. per min. Convertible to bucket loader.



B-G 710 Ditcher sets outstanding performance record on 100 mile coaxial cable job.

## FAST CLEANUP OF CITY STREETS

B-G Snow Loaders have proved themselves throughout the "snow belt" as efficient, effective means of keeping city traffic moving, saving parking meter revenues and radically cutting the costs of snow removal. They offer benefits that can mean real savings to small towns as well as the largest cities.

B-G Snow Loaders provide fast, efficient snow removal service under the most severe conditions.

B-G Railroad Snow Loader-Melter. Clears yards, terminals, loading areas. Capacity, 30 cu. yds. per min.



## ROCK AND TREE STUMPS GIVE WAY TO B-G DITCHERS

Orlando, Fla.: Digging up to 1½ miles in a 4½ hr. working day—through stump-strewn coral rock—is the regular performance of two B-G 710 cable laying ditchers on this 100-mile coaxial cable job. The rapid saw-like action of the B-G Bucket line overcame the stump and rock problems. The cable is fed from a large reel and the ditchers tow backfilling plows which close the trench behind the cable.

## FOR THE LATEST IN MATERIAL HANDLING, ASPHALT CONSTRUCTION OR DITCHING... USE THE COUPON

Complete specifications and literature are available on all the B-G equipment described in this bulletin. The coupon below makes it handy for you to quickly receive information which may lead to many cost-reducing improvements in your business operations. Look this bulletin over carefully and send in the coupon today.



Barber-Greene Company  
Aurora, Illinois, U.S.A.  
Cable address "Bargreene"

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| <input type="checkbox"/> Send information on B-G equipment as indicated | <input type="checkbox"/> B-G Portable Conveyors  |
| <input type="checkbox"/> Have Barber-Greene representative call         | <input type="checkbox"/> B-G Coal Yard Equipment |
| <input type="checkbox"/> B-G Bituminous Mixing Plants of _____ capacity | <input type="checkbox"/> B-G Ditchers            |
| <input type="checkbox"/> B-G Travel Plants                              | <input type="checkbox"/> B-G Snow Loaders        |
| <input type="checkbox"/> B-G Bucket Loaders of _____ capacity           | <input type="checkbox"/> B-G Belt Car Unloaders  |
| <input type="checkbox"/> B-G Permanent Conveyors                        |  |

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## YOUR B-G DISTRIBUTOR IS THE BEST SOURCE OF RELIABLE ADVICE AND SERVICE

There is a Barber-Greene Distributor near you, ready to give you personalized information regarding your specific requirements and where B-G equipment fits into your picture. At your service is his staff of trained service and sales experts. When you talk with your Barber-Greene distributor, you can have the fullest confidence in his ability to specify for your needs.

Your B-G Distributor can give you other cost-saving bulletins listed below:

Bulletin 4901 Portable Conveyors

Bulletin 4902 Bucket Loaders

Bulletin 4903 Bituminous No. 1

Bulletin 4904 Ditchers

Bulletin 4905 Permanent Conveyors

Bulletin 4907 Bituminous No. 2

**BARBER-GREENE COMPANY**  
Aurora, Illinois, U.S.A.





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Eaton's exclusive forced-flow lubrication system starts oil on its way to all moving parts the instant the axle turns over. This protection to gears at low truck speeds, as well as high, reduces friction and wear on moving parts, adds thousands of miles of trouble-free life to Eaton 2-Speed Axles. Your truck dealer will be glad to explain how Eaton Axles contribute to lower operating and upkeep costs by embodying a balanced combination of pulling power and speed on most trucks of the 1 1/2-ton class and larger.

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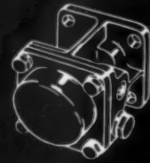


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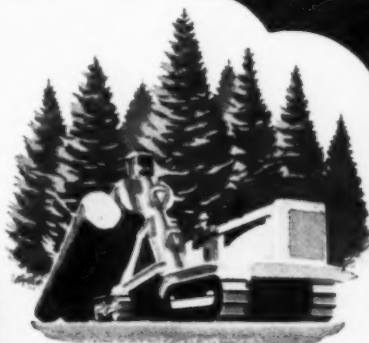
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In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISSCOLAY® Preferred. It lasts longer—is easier to cut, splice and install. It's kink-resistant and safe to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant—Palmer, Mass.

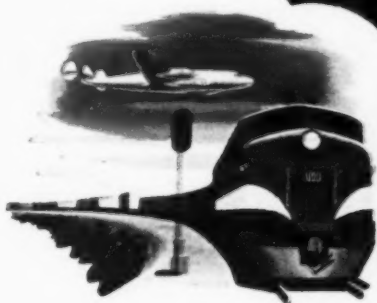
IN THE EAST—Wickwire Spencer Steel Div. of C. F. & I.  
500 Fifth Ave., New York 18, N. Y.

IN THE ROCKIES—The Colorado Fuel and Iron Corp.  
Continental Oil Bldg., Denver, Colo.

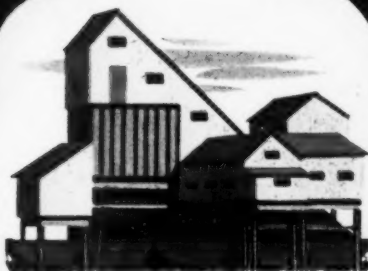
ON THE WEST COAST—The California Wire Cloth Corp.  
1080—17th Ave., Oakland 6, Cal.



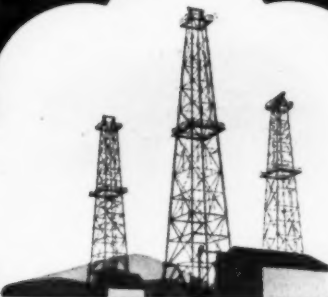
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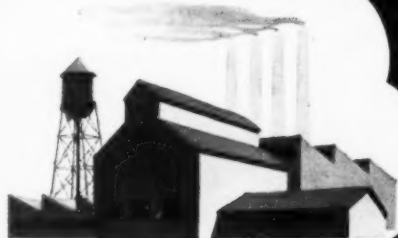
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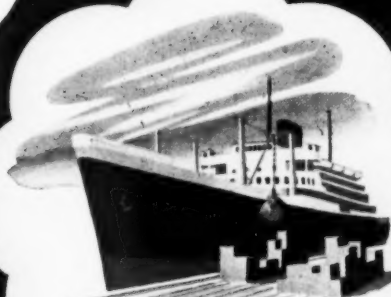
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Look to **SICARD** for **PERFORMANCE**



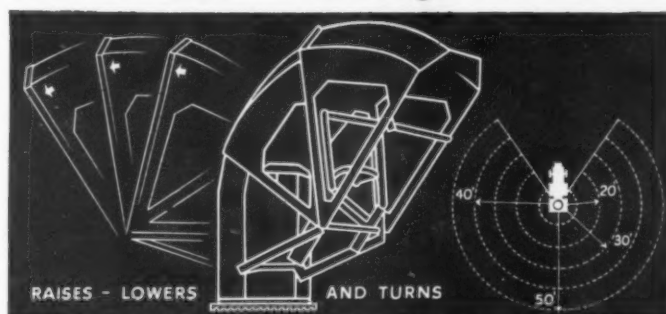
## Snow Master

with **EXCLUSIVE** Wrist-action chute and long-range Reversible Casting Turbine.

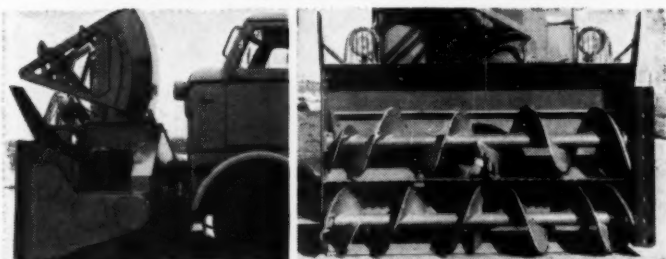
The Snow Master has *proved* its superiority under the severest conditions—on highways, airports and city streets. *Engineered for the job*, the Sicard Snow Master has won its leadership in action through 25 years of *superior* performance.

The Snow Master's twin augers cut an eight-foot swathe through snow, slush and even ice . . . clean from curb to curb. Finger-tip controls instantly adapt the equipment to any conditions.

On crowded city streets, hangar aprons and around buildings the *exclusive* patented "Wrist-Action" Chute precision-casts to any desired spot, or pack-loads trucks to capacity. For highways, runways and other open areas, the unique Casting Turbine propels snow up to 150 feet on either side—eliminates banks and back-drifting. In city or country, only Snow Master has the versatility to handle your *every* snow clearance problem.



Patented "Wrist-Action" Chute raises and lowers, swings right or left on a 220° arc. Snow can be thrown from three to 50 feet into moving trucks or open spaces, leaving intersections clear.



For highway or airport clearance, casting turbine propels snow up to 150 feet on either side. Operations can be switched instantly to loading chute, when desired.

Twin augers can be fitted with special cutters to grind ice to powder, for disposal through either chute or turbine. Exclusive equalizer bar prevents clogging.

For name of your nearest distributor, write to Sicard Industries, Inc., manufacturers of the Snow Master Junior, the Snow Master, the Sanivan and the Master Flusher.

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SPEEDS—four forward, 2.40 to  
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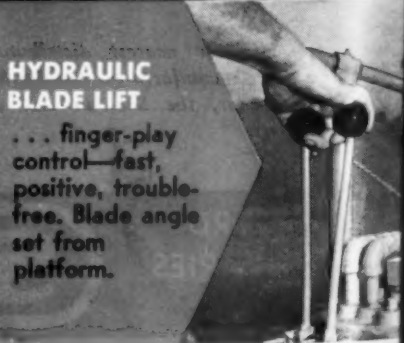


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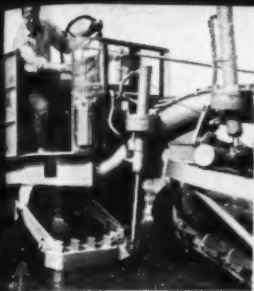
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... finger-play  
control—fast,  
positive, trouble-  
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set from  
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**HYDRAULIC SCARIFIER** — does a surprising job  
...rear-end weight keeps teeth ripping uniformly,  
at desired depth—smooth, positive steering.



**LOADS MATERIAL** into trucks with  
Tractomotive Loader—from windrows  
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**PLOWS SNOW** with specially de-  
signed Baker snowplow (backfills  
with interchangeable blade).

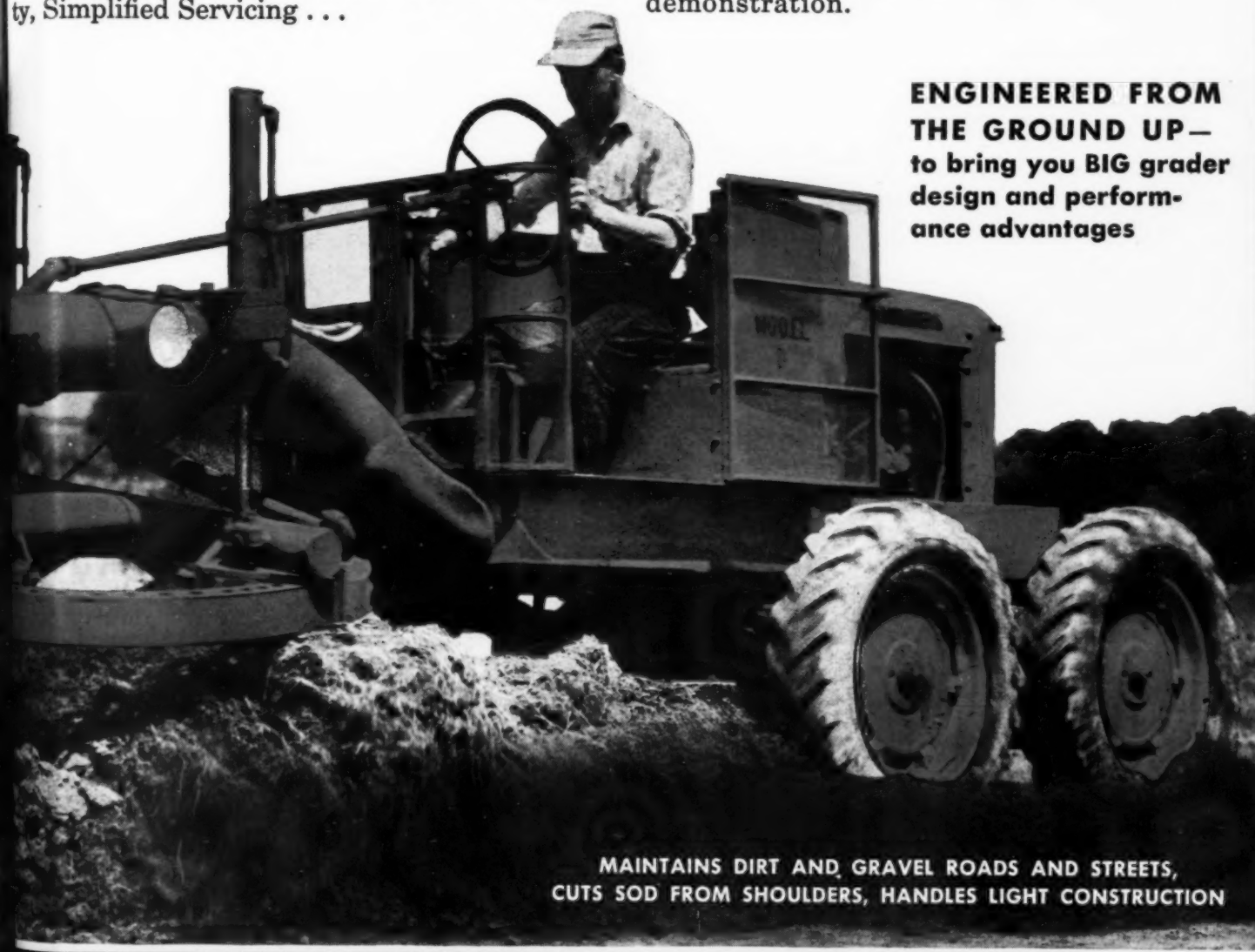
## One-third the price of large motor graders

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. . . Plus special attachments that widen its usefulness — Rear-End Loader, Scarifier, V-Type Snowplow with interchangeable blade for back-filling and light 'dozer work. Also various other accessories.

Ask your Allis-Chalmers dealer for a demonstration.

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THE GROUND UP—  
to bring you BIG grader  
design and perform-  
ance advantages**



MAINTAINS DIRT AND GRAVEL ROADS AND STREETS,  
CUTS SOD FROM SHOULDERS, HANDLES LIGHT CONSTRUCTION

# ALLIS-CHALMERS

TRACTOR DIVISION

MILWAUKEE 1, U. S. A.



## YOU NEED A BUILDING?

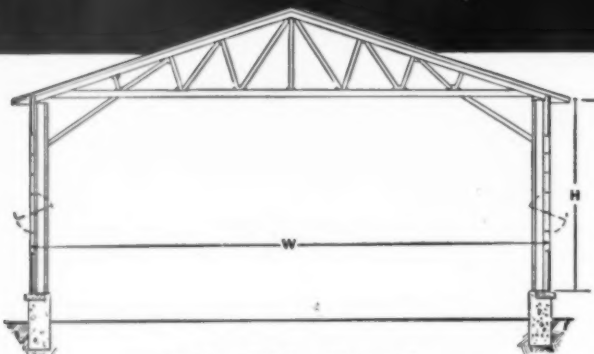
Meet your Problems of Space, Production or Storage by using **TRUSCON** Standardized Steel Buildings.

## YOU NEED IT WHEN?

Prompt delivery of **TRUSCON** Standardized Steel Buildings within certain size limitations is now possible.

## YOU NEED IT WHERE?

These standard-unit, pre-fabricated structures can be shipped anywhere, are easily and speedily erected and dismantled, allowing extreme flexibility.

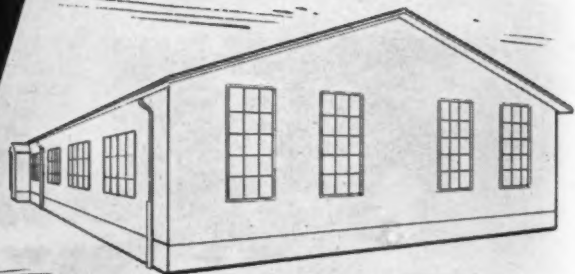
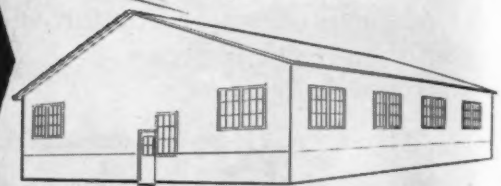
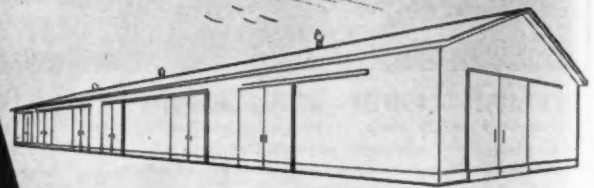


Series "A"—Type 1

Standard Heights of Sidewalls	Standard Widths of Buildings
H	W
8'-1 1/4", 10'-9 1/4", 13'-5 1/4", 16'-1 1/4"	8'-0", 12'-0", 16'-0", 20'-0" 24'-0", 28'-0", 30'-0"

## TRUSCON STEEL COMPANY

YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation



Truscon Standardized Steel Buildings are now available in Series A design of widths not exceeding 30 feet, in heights up to 16 feet 1 1/4 inches and any length in multiples of 4 feet. Roof can be either steel interlocking type or Ferrobord Steeldeck with insulation and waterproofing. These Truscon Steel Buildings are used for all kinds of industrial and commercial structures because they offer fire resistance, permanence, ease and speed of erection, low upkeep, low cost, high investment value. And Truscon Steel Buildings have a high salvage value which permits them to be dismantled and re-erected in an entirely new location.

Write for complete information today. Truscon engineers will be glad to make suggestions and help you select the building that fits your needs.

Manufacturers of a Complete Line of Steel Windows and Mechanical Operators . . . Industrial Steel Doors . . . Steel Joists . . . Metal Lath . . . Complete Steel Buildings . . . Steeldeck Roofs . . . Reinforcing Steel . . . Radio Towers . . . Steel Boxes and Platforms . . . Foundry Flasks.

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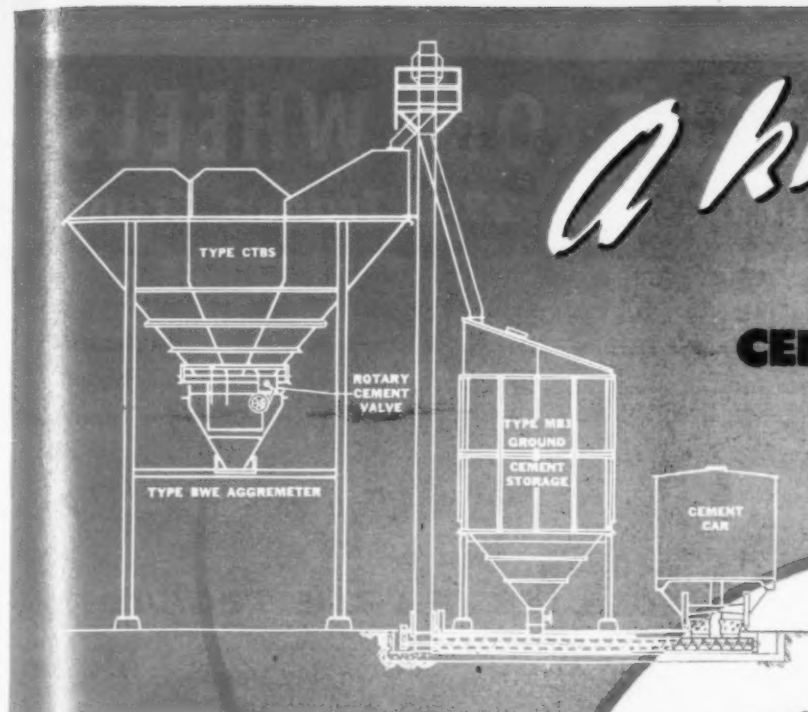
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3910 G

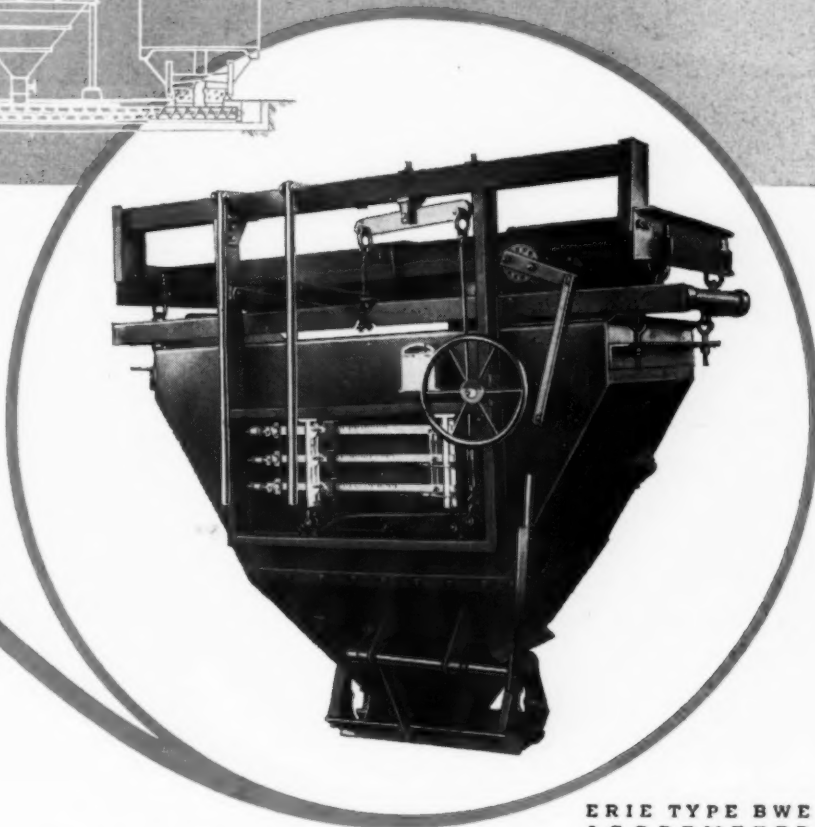
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# *A knock-down* **TRUCK MIXER** *or* **CENTRAL MIX PLANT**

3 or 4 Compartments-in-line  
combining Aggregate and  
Cement with Auxiliary Ground  
Storage Cement Bin.



The heart of the above ERIE CTBS Knock-down Truck Mixer plant is the improved Erie BWE AggreMeter at the right. It is arranged with one compartment for aggregate and one for cement—all controls are located for fast and easy operation. An Erie MB-3 Cement Bin alongside, provides up to 492 bbls. auxiliary cement storage, fed by under track screw conveyor to vertical bucket elevator which directs cement to main plant or auxiliary cement storage. (Type LB-3 Cement Bin offers up to 1025 bbls. of cement storage.) This is just one of scores of Erie Bin Combinations so let's have your aggregate and cement storage and batching problem.



ERIE TYPE BWE  
AGGREGATE METER

Which 3\* compartment-in-line combining aggregate and cement fits your needs?

CEMENT GROUND STORAGE		MAIN PLANT*			AGGREGATE METER
TYPE	CAPACITIES	TYPE	TOT. CAP.	CAPACITY CEMENT COMPARTMENT	TYPE BWE 3 BEAM SCALE
MB-1	172 to 194 bbls.	CTBS	98 Cu. Yd.	230 to 260 bbls.	1 ½ — Cu. Yd.
MB-2	270 to 304 bbls.	CTBS	118 Cu. Yd.	275 to 308 bbls.	2 — Cu. Yd.
MB-3	437 to 492 bbls.	CTBS	160 Cu. Yd.	330 to 375 bbls.	3 — Cu. Yd.
		CTBS	202 Cu. Yd.	380 to 430 bbls.	4 — Cu. Yd.
					5 — Cu. Yd.
					6 — Cu. Yd.

\*For 4 Compartments-in-line combining aggregate and cement ask about Erie Type CTES plants and EWE AggreMeters.

# ERIE

STEEL CONSTRUCTION COMPANY

3910 GEIST ROAD • ERIE, PENNSYLVANIA



# FOR BIG OUTPUT ON WHEELS

Look into the New Bucyrus-Erie 22-B Transit Crane

Now you can get the 22-B on a big fast-moving new wheel mounting! That means speedy mobility plus famous 22-B output, dependability, and economy—the combination you need for fast profitable handling of scattered, diversified jobs.

Look over the partial list of important features that make the new 22-B transit crane outstanding among wheel-mounted machines. Ask your Bucyrus-Erie distributor for complete details today.

BUCYRUS-ERIE COMPANY • South Milwaukee, Wis.

**Convertible—**

- CRANE
- CLAMSHELL
- DRAGLINE
- SHOVEL
- DRAGSHOVEL

## Check these Bucyrus-Erie Features:

- ✓ Bucyrus-Erie Wheel Mounting by Sterling.
  - 181" wheelbase.
  - 8'0" width over standard tires and guards.
  - 142 H.P. engine in wheel mounting.
  - 31 miles per hour.
  - Hydraulic booster for a steering gear (extra).
- ✓ Same basic upperworks as 22-B caterpillar-mounted machines.
- ✓ Full power-controlled boom and safety boom stops for lifting crane.
- ✓ New stronger crane type boom for crane, clamshell, or drag-line.
- ✓ Booms 30 to 80 feet; lifting capacity with 40-ft. boom at 48° angle and 30-ft. operating radius, outriggers set—10,200 lb.
- ✓ New type 8- or 16-part boom suspension.
- ✓ Anti-friction bearings on all operating parts in hoist, swing, boom hoist, and crowd machinery on the main frame.
- ✓ Flood oil lubrication for transmission chain and all gears (except main swing gear and pinion).
- ✓ Interchangeable friction clutches and clutch parts for hoist, swing, crowd, propel.
- ✓ Reversible friction band linings — practically double lining life.



**BUCYRUS  
ERIE**

South Milwaukee, Wisconsin





**ROADSIDE REPORT** by H. Petrey of Arlington, Texas.  
Ford Model F-8 shown has a G.T.W. rating of 39,000 lbs. as a tractor. G.V.W. rating is 21,500 lbs.

## "My FORD moves this equipment 10 miles faster than 5 other makes I tried!"

"RECENTLY I purchased a Ford F-8 to haul a 50,000 lb. crane from job to job," reports H. Petrey of Arlington, Texas. "I must say this 145-horsepower Ford F-8 is the King of them all. It moves this equipment 10 miles faster and safer than the 5 different trucks of other makes that I have tried, to date. I am real proud of this BIG JOB."

In terms of *Payload-Performance* the Ford BIG JOBS have no equal in their class. No other truck offers so much payload capacity in relation to chassis weight with as high a horsepower rating per gross ton. This means bigger payloads within legal load limits. It means faster, more profitable delivery of big loads. Ford's high *Payload-Performance* is evidence of Bonus Built construction. Each of over 150 Ford Truck models is Bonus Built... built extra strong to last longer.

\*BONUS: "Something given in addition to what is usual or strictly due"—Webster



**BUILT STRONGER TO LAST LONGER**

USING LATEST REGISTRATION DATA ON 6,106,000 TRUCKS,  
LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

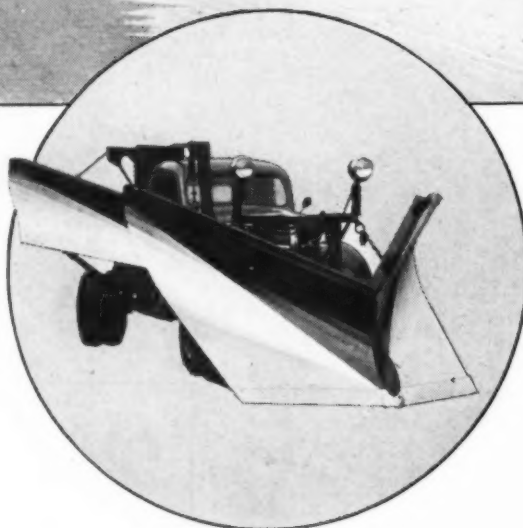
## ONLY THE FORD BIG JOB HAS ALL THESE FEATURES

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford concentric dual-throat carburetor for more power, more economy.
- ★ Big Ford power-operated hydraulic brakes; front 16-inch by 2¼-inch; rear 15-inch by 5-inch double cylinder on F-7, 16-inch by 5-inch double cylinder on F-8. Air brakes also available for F-8.
- ★ New heavy duty 5-speed transmissions—over-drive or direct-in-fifth—for operating flexibility.
- ★ Ford Super Quadrax single speed axles; two-speed axle available in Model F-8.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross Combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.

## TAILOR MADE

to fit the **SNOW** problems in your area . . .



**NO WEDGE!  
NO SIDE THRUST!**

**NO BUCKLING!  
NO SIDE-SLIPPING!**

**E**very one of Frink's 15 snow plows is scientifically engineered for faster snow removal in any area . . . ruggedly built for more hours of continuous service . . . economically priced for any city, county, or state budget.

Frink Sno-Plows are available for trucks with capacities from 1½ to 12 tons. For further information about the plow best suited to your needs, write Box P51W Clayton, N. Y.

### MORE FEATURES

1. Exclusive self-ballasting feature prevents nose from "riding up" and prevents slipping when widening out.
2. Full power hydraulic control permits easier, faster handling.
3. Reversible cutting edges give double wear for greater economy.
4. Hinged deflectors keep windshields free from flying snow.
5. Side-leveling wings are optional.

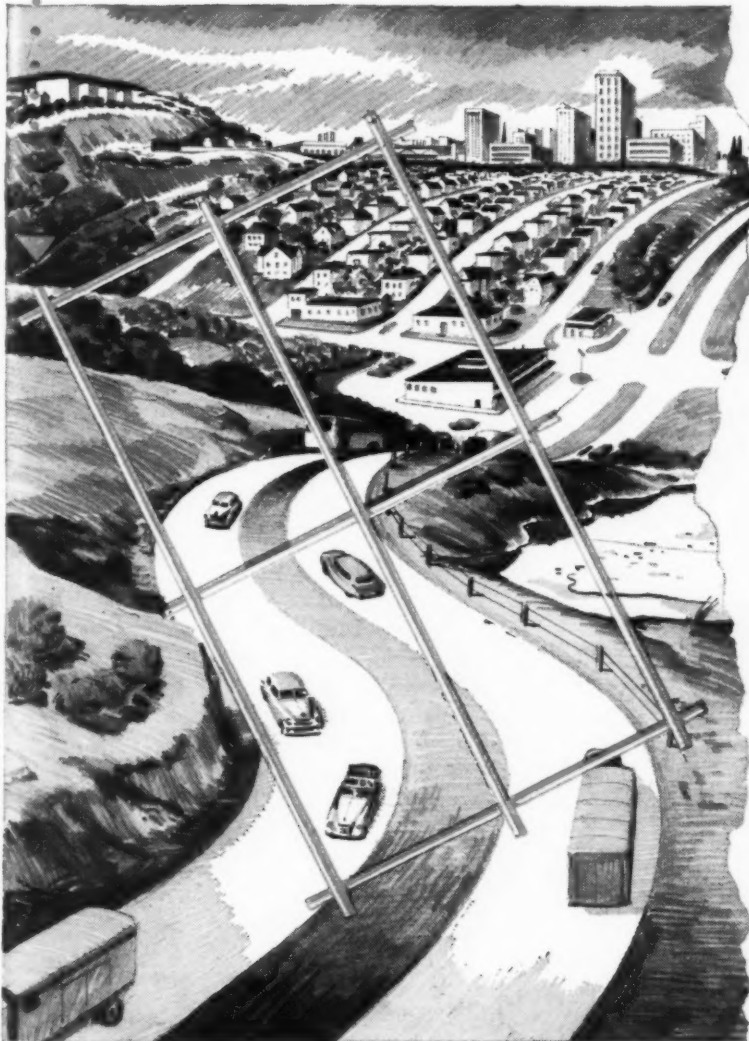
For further information write Box P51W Clayton, N. Y.

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK      DAVENPORT-BESLER CORP., DAVENPORT, IOWA

FRINK SNO-PLOWS OF CANADA, LTD., TORONTO, ONT.

..... Protect the roads against the loads

# buy American Welded Wire Fabric

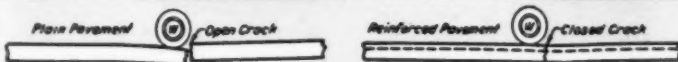


Cross country roads and city streets are constantly being pounded by heavier loads, in bigger trucks, traveling at higher speeds. That they stand up so well is due to the fact that practically all concrete traffic arteries are reinforced, most of them with American Welded Wire Fabric.

This continuous mat of metal—with its many small, closely spaced strands of high yield-point, cold drawn steel—reinforces the road slab evenly, from edge to edge and from end to end, against stresses and strains in all directions. Thus the rate of cracking is reduced, and such cracks as do occur are held tightly closed, preventing progressive damage to the slab and the sub-grade.

Many years of practical service—in many thousands of miles of concrete highways and city streets—and tests of sample roads to the point of destruction, have proved the definite superiority of American Welded Wire Fabric reinforced pavements over other types. It is economical, too, for you use less steel, less concrete, to form a slab of comparable strength; American Welded Wire Fabric is so easily handled, so quickly laid, that you also save on construction time and labor cost.

U·S·S American Welded Wire Fabric is available in a wide variety of types, designed to meet every paving need. Our consulting staff will be glad to supply engineering data for any job you have on hand. Just drop a line to the sales office on this list that is nearest to you. You do not incur the slightest obligation.



As the wheel load approaches an open crack in plain pavement, one slab end carries the entire load. As the wheel load approaches the closed crack in pavement reinforced with American Welded Wire Fabric, both slab ends, instead of one, carry the load, preventing damage to the slab and to the subgrade.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO  
COLUMBIA STEEL COMPANY, SAN FRANCISCO  
PACIFIC COAST DISTRIBUTORS  
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM  
SOUTHERN DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

*Every concrete paving job needs*



## AMERICAN WELDED WIRE FABRIC

*reinforcement*

UNITED STATES STEEL



# CLEAN AS A WHISTLE!

## Roto-Clone eliminates aggregate dryer dust as a community problem

**T**HERE'S no getting around it—communities are becoming more dust conscious. If you are operating an asphalt plant in a populated area, sooner or later the dust from your plant will be subject to criticism.

Over 40 plants in 17 states have solved this problem quickly and economically by equipping the aggregate dryer with Roto-Clone\* dust control. Note the plant illustrated here. The 100-ton Simplicity Dryer is running full blast . . . and not a sign of dust!

Here's how it's done. First, the dust-laden air passes through a Precleaner which removes a high percentage of the usable material and collects it for dry salvage. Then the air enters the Type W Roto-Clone which traps the finest and lightest dust particles by a combination of dynamic precipitation and water sprays. Finally, the air is exhausted dust-free with the water and collected material discharged as a fine slurry.

Why not beat your critics to the punch. Solve that dust problem now! For complete Roto-Clone information, call your nearby AAF representative or write direct to—

### AMERICAN AIR FILTER COMPANY, INC.

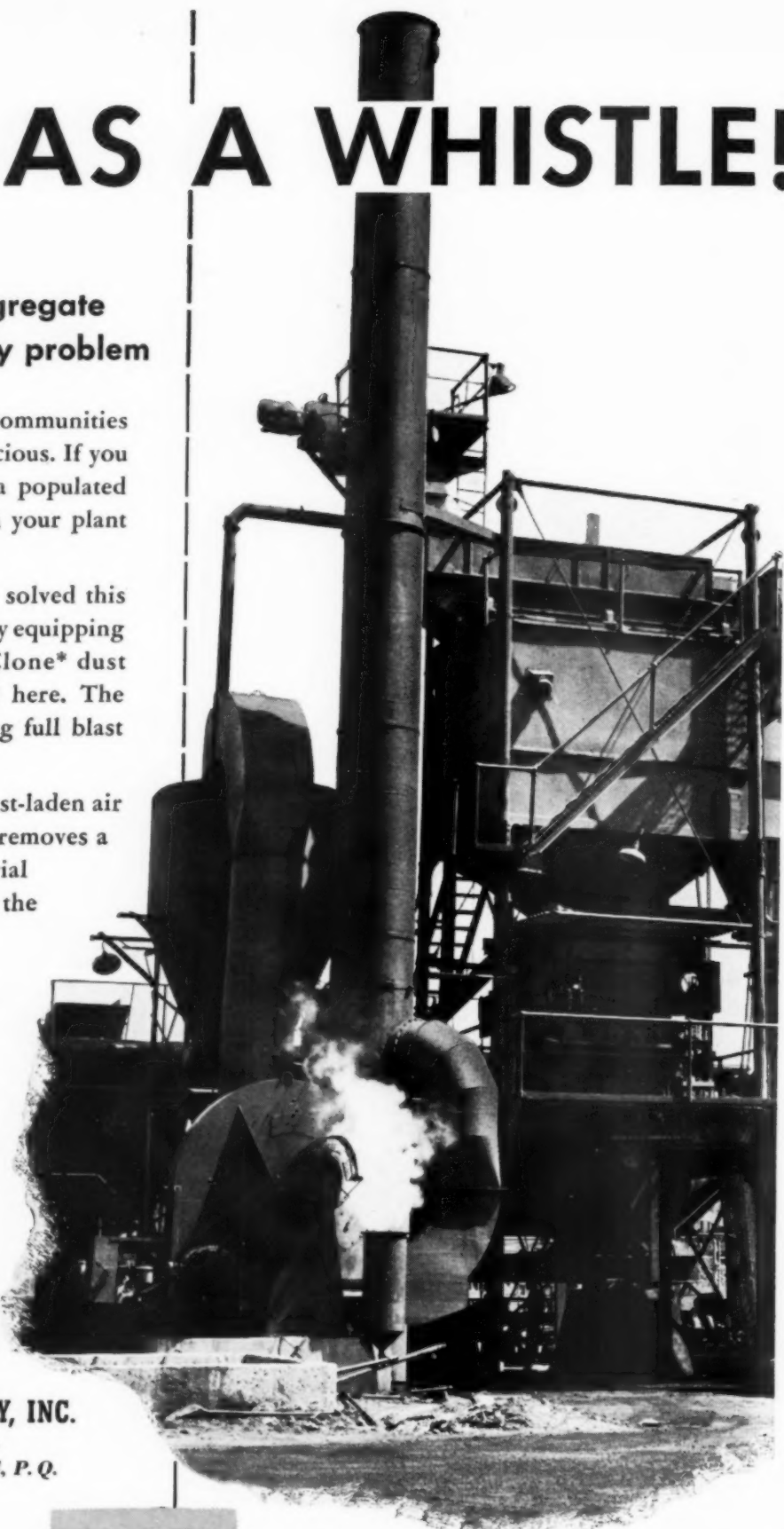
306 Central Avenue, Louisville 8, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.

*\*Roto-Clone is the trade mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

**AAF**

**ROTO-CLONE®**  
**DUST CONTROL EQUIPMENT**



# Facts you should know

## About the New General Motors Diesel Engine-Torque Converter Unit



Two 190 H.P. 6-Cylinder GM Diesel Engine-Torque Converter units power the new 34-ton Euclid 1-FFD tandem axle rear-dump. Each engine drives one rear axle, eliminating the conventional inter-axle power divider. A 3-speed Allison Torromatic transmission does away with the clutch pedal and manual shifting. Designed for off-the-highway haulage of large tonnage, the mammoth 1-FFD has a top speed of 25.4 m.p.h. with full pay load.

**ONE MANUFACTURER RESPONSIBILITY** The new torque converter is specifically designed and manufactured by General Motors as an integral unit with the Series 71 two-cycle Diesel engine. Result: a big saving in size and weight—no compromise designs—no divided responsibility.

**AUTOMATIC SHIFT FROM TORQUE MULTIPLICATION TO FLUID COUPLING** Desirable features and advantages of both torque converter and fluid coupling are combined in this converter. Continuous automatic transition from 3.6-to-1 torque ratio at stall speed to 1-to-1 torque ratio in fluid coupling. Unit goes into fluid coupling whenever load requirements equal engine torque, without regard to output shaft speed.

**MORE WORK IN LESS TIME** This new power unit gets the most work done in the least time. Because it is not rigidly geared to the load, the engine responds to the throttle and immediately accelerates to a high output range regardless of the speed of the load.

**FREEDOM FROM SHOCK LOADS** Transmission of power through a liquid, cushions both engine and

driven machinery from sudden shock loads. Operation is liquid-smooth (free from jerks) at any speed or throttle setting.

**FREEDOM FROM STALLS WITH OVERLOAD** Fluid circuit prevents engine stalling under any load condition. Ability to exert a smooth pull at any output shaft speed down to zero permits GM Converter-equipped machines to do some operations that are impossible with conventional units.

**EASE OF HANDLING** Eliminates time lost in unnecessary low gear operation. Operator fatigue is reduced. Work is speeded up with less effort on the part of the operator.

**WIDE RANGE OF MODELS** The new GM Diesel Engine-Torque Converter unit is made available in 3-, 4- and 6-cylinder single engine units, Twin 4 and Twin 6 multiple engine units with engine ratings from 64 to 294 B.H.P. to meet a wide range of power requirements. Write or wire for full details.

### DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES...Up to 200 H.P. DETROIT 28, MICHIGAN MULTIPLE UNITS...Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK





Here's a friend that sticks! Through fair weather and foul. Under all kinds of conditions.

This rubber-bearing, thermoplastic compound seals joints smoothly, neatly, *positively*...and far outlasts old-fashioned materials.

- 1) Special equipment enables you to melt and pour Flintseal® quickly, safely, economically...and gives you a neat, smooth-riding joint.
- 2) Flintseal adheres to concrete with a tight, lasting bond, effectively sealing out moisture and other foreign matter that wreak havoc between and under the slabs.
- 3) Flintseal stays resilient. It won't become brittle and crack in coldest weather, nor will it flow on hottest days.
- 4) Because of this *lasting* resilience and adhesion, Flintseal maintains a tight joint throughout repeated cycles of expansion and contraction of the slabs.



Exceptionally satisfactory for sealing joints and cracks in concrete, Flintseal is finding wide use on municipal pavements, highways, airport runways and many smaller jobs in swimming pools, roofs, platforms and the like.

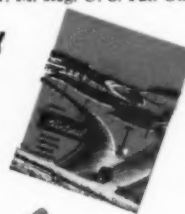
Get complete information on how joining up with Flintseal can save *you* time, money and trouble...by giving you a fast neat job, and cutting maintenance costs to the bone. Write today for your copy of the free folder illustrated.

\*T. M. Reg. U. S. Pat. Off.

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# Flintseal

**HOT-POURED  
JOINT-SEALING COMPOUND**



# YOU GET ALL FOUR

with this **HOMELITE**  
**ONE MAN**

Gasoline  
Engine Driven

# CHAIN SAW

**EASIEST HANDLING**

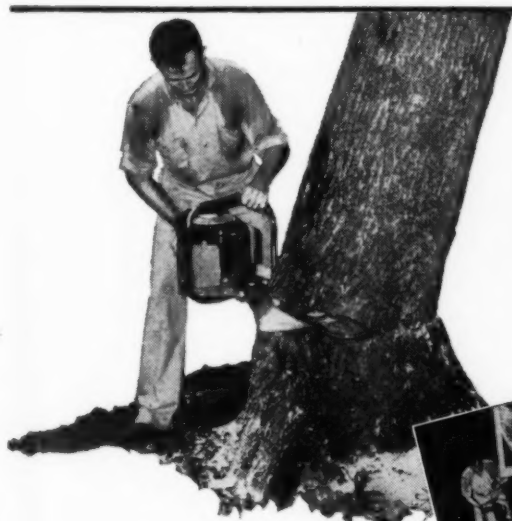
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**LIGHTEST WEIGHT**

**LOWEST MAINTENANCE**



Just look at how fast it cuts



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An 18 inch softwood tree in 18 seconds . . .  
an 18 inch hardwood tree in 35 seconds  
flush to the ground. That's fast cutting. In  
fact, for a saw that weighs only 33 lbs. com-  
plete, it's 30 to 40 per cent better than par.  
The reasons, of course, are Homelite rea-  
sons. One: a light but powerful Homelite  
engine. Two: a specially designed Homelite  
kerf, chrome-plated chain that removes less  
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chatter. Truly, this new Homelite Chain Saw  
is the most amazing one man gasoline  
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Built and Backed by HOMELITE,  
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## IT'S ALL THE SAME TO A **BAKER** BULLDOZER

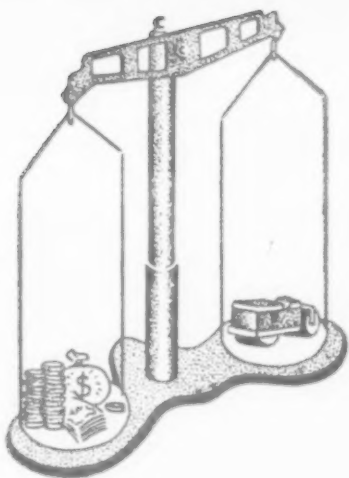
*Any job...any condition* a Baker Bulldozer takes it in stride. There's built-in brute strength for the toughest going; fast acting, simplified hydraulic control; positive down pressure; plus perfect balance that utilizes every ounce of tractor power. No wonder Baker Bulldozers and Gradebuilders teamed up with Allis-Chalmers tractors are rated

the top bulldozing team in the business.

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It's an all weather—all year round team that turns low margin jobs into profitable ones—it's a versatile team that pays for itself on any job. Get the complete facts from your friendly Baker—Allis-Chalmers dealer today.





*the Balance*  
**IS IN YOUR FAVOR  
 WITH MODERN**



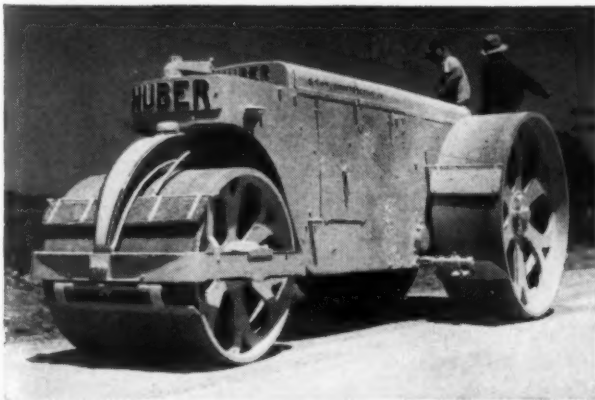
**ROAD MACHINERY**



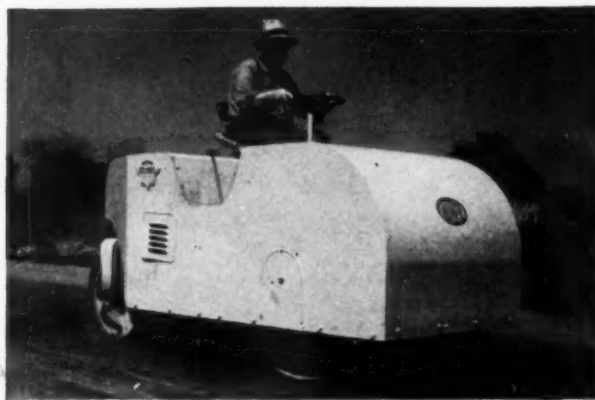
Huber's versatile Road Maintainer—a lift loader, berm leveler, bulldozer, patch roller, snow plow, or rotary broom all in one.

Today's conditions demand that your operation's budget balance out. Modern Huber road machinery will help you do better than that—the efficient, result-producing Huber line will actually tip the balance in your favor.

Road men, from maintenance crews to new road contractors recognize the "extras" that are built into every piece of Huber equipment. Plenty of power...economical operation...dependable performance...and the ability to do any job are Huber traits that point to more profitable road operations for you. Write today for bulletins on the Huber equipment that will best serve you.



Huber's always dependable 3-Wheel Rollers—built in sizes, from 5 to 12 tons, suited to any rolling operation.



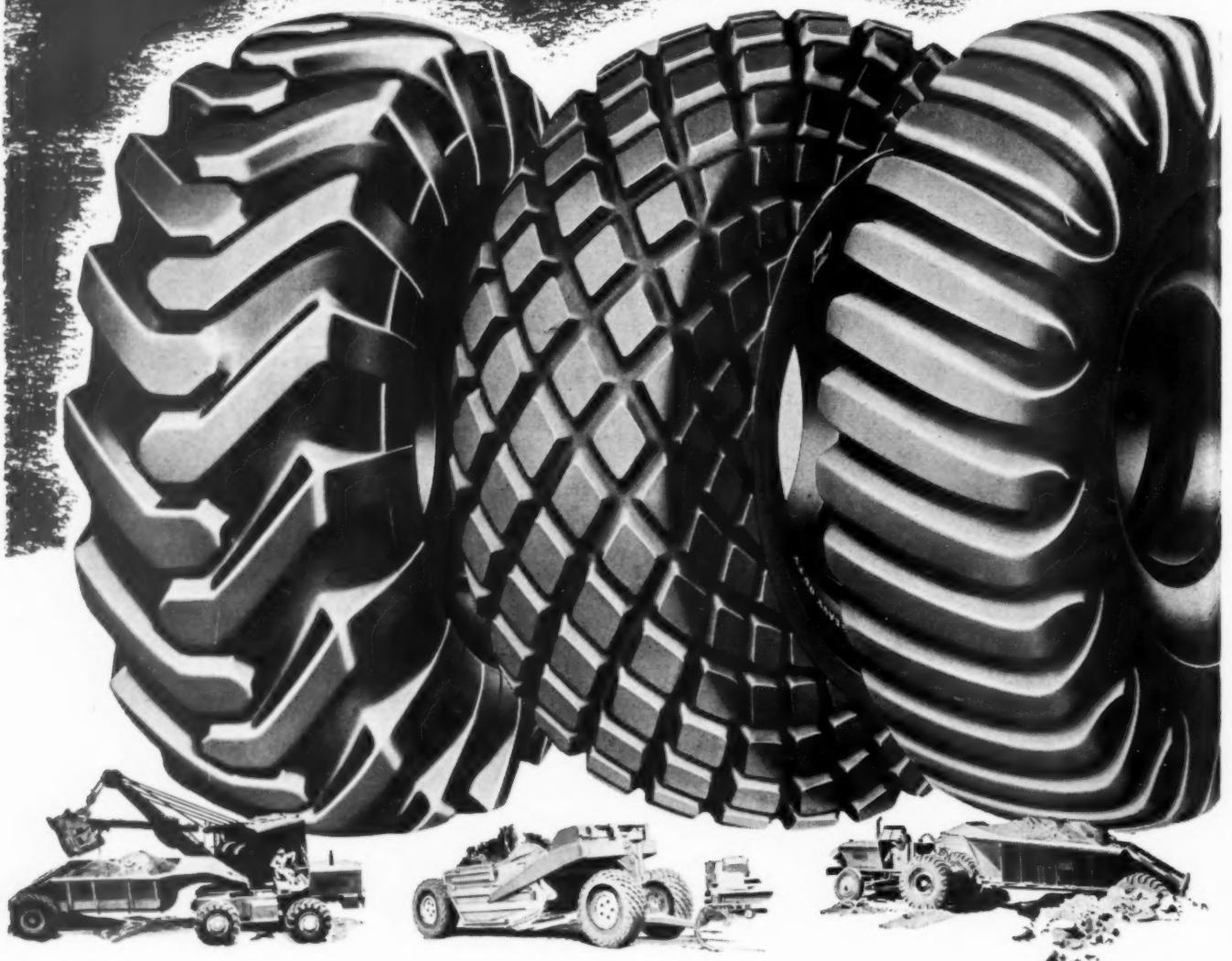
Huber's highly maneuverable Tandem Rollers lend themselves to many special tasks. Variable weight models from 3 to 14 tons.

THE  MFG. COMPANY • MARION, OHIO, U. S. A.

**HUBER** *3 Wheel • Tandem*  
**ROAD ROLLERS**  
*and*  
**MAINTAINERS**



# TOP THREE!



## EARTH MOVER SURE-GRIP

for maximum traction on  
drive wheels

## EARTH MOVER ALL-WEATHER

for drawn vehicles and  
general traction

## HARD ROCK LUG

for super-stamina in all  
rock work

**F**or trouble-free, long-lasting service—  
to move more yards faster at lower cost—  
always **BUY** and **SPECIFY** Goodyear—it pays!

# GOODYEAR

## OFF-THE-ROAD TIRES

Sure-Grip, All-Weather—  
T.M.'s The Goodyear Tire & Rubber Company

## Old Parallel Trestle Aids Construction of

# Pensacola Beach Bridge

*In this exceptionally clear and detailed article, the contractor's superintendent tells step-by-step methods used to cast and drive long concrete piles, erect forms and place deck concrete, sink bascule piers and erect lift bridge steel. Movable aluminum bridge a novel feature of the work*

**By Dan S. Brock**

Superintendent, Johnson, Drake & Piper, Inc.,  
Minneapolis, Minn., and New York, N. Y.

**A**NOTHER step forward in the development of the natural Gulf Coast playground of Santa Rosa Island is the construction of the Pensacola Beach Bridge across Santa Rosa Sound, near Pensacola, Florida. Replacing the existing timber structure, a new reinforced concrete pile trestle with a bascule span was constructed by Johnson, Drake & Piper, Inc., for the Santa Rosa Island Authority, an agency of Escambia County.

First steps in the development of Santa Rosa Island were taken 20 years ago by the Pensacola Bridge Corporation and the Northwest Florida Corporation, a group of local citizens and contractors headed by Lewis H. Piper, then president of Johnson, Drake and Piper. This project consisted of the building of the Pensacola Bay Bridge which is a 3-mile-long concrete structure with draw span, two miles of roadway to the present timber Pensacola Beach Bridge, and a Casino on the Island. Land routes east of Pensacola were shortened. The opening of this previously inaccessible area to the public is another example of the role the construction industry plays in the development of the country.

The 3,640 ft. Pensacola Beach Bridge is made of 104 spans each 33 ft. long and a double steel bascule draw span. Roadway width is 28 ft. The entire superstructure, bascule piers and substructure, of reinforced concrete, were designed by the Authority in conjunction with the Florida state highway department for H-20 loading. The roadway at the bascule piers is 30 ft. above water; the grade on either side

is 1.08%. The project in addition to the bridge includes removal of the old bridge and construction of one mile of approach paving, the latter job requiring 80,000 cu. yd. of hydraulic embankment which will be stabilized with clay and bituminous material. The project will cost about \$1,500,000.

### Concrete Piling Methods

Work started in June, 1948, with the driving of 18-in. square precast concrete test piles, size of piles to be used. Results confirmed estimates that piles from 40 to 70 ft. in length would be required. The casting yard was set up in Pensacola where a 35-ton railroad crane handled material, poured concrete and loaded piling on barges. Casting operations began July 15, and were completed Oct. 18, 1948. 442 piles were cast with a total length of 27,130 lin. ft.

Eye bolts in Richmond Screw Anchors cast in the piling were used in handling piles in the casting yard. High-early cement was used in all piles to save time and yard storage space.

Concrete pile driving was carried on in a rather unusual manner because of tide, weather and prevailing wind conditions. A T-shaped template 100 ft. long built of light structural angle members was used, which permitted the pile driver to be free of the piling during driving operations. The head of the T served as a guide for setting the piles in position and for setting the pile batter. The 98 typical bents each consisted of 4 piles, the outside piling battered laterally 1½ in. per ft. There were, in addition, 4 tower bents of 7 piles each with piles battered 2 in. per ft. alternately in the longitudinal direction of the bridge; and two approach bents with 9 piles arranged similarly to the tower bents.

The template was designed to take care of the several exceptions to the typical bent. A stiff leg derrick with a 70-ft. boom, on a 36' x 90' steel barge, was used for the driving.

### Pile Driving Procedure

Driving was started at the North end, with the long leg of the template resting on shore and the pile driver

★ Concrete pile driving template and derrick barge







★ Air view of bridge looking southeast. New bridge on right of existing bridge. Santa Rosa Island and Pensacola Beach in background

sitting directly behind the template. The barge with the piling was tied alongside the pile driver barge. On completion of the first bent, the driver was moved back and the template then supported on the first bent as well as the approach. As this method of driving proceeded, the template was supported entirely on bents already driven. Piles were jetted to within 3 to 5 ft. of required penetration and then driven to grade.

It was found that because of existing soil conditions the pile would freeze and develop bearing if jetting were interrupted and the pile allowed to stand for several minutes before driven to proper depth. The only complication in an otherwise fast-moving, efficient operation was the rock riprap encountered in driving the first few bents at the North and South approaches. The crew averaged two bents driven per day, with better than three bents on some days. The first 57 bents were driven working outward to the old bridge's navigation channel, then operations were shifted to the South

approach and work progressed northward to bent 62 at the channel.

Driving started July 18, 1948, and with the exception of the four bents omitted from the channel, driving was completed by Nov. 8, 1948. The template enabled the crew to set an entire bent before jetting and driving operations started. And of course this meant that driving operations could be stopped at any point at the end of a day, or could be interrupted without loss of time or damage when storm warnings necessitated taking the pile drive barge and pile barge into safe waters. This was a decided advantage, as driving took place during the hurricane season and storm warnings were frequent. Alignment and location of piling were carried to a fine degree of accuracy and required no special changes in superstructure design because of any mislocation.

### Concreting the Superstructure

Concrete for superstructure, pile caps, decks and bascule piers was batched in Pensacola and hauled in 2-batch trucks to the job. For maximum efficiency in handling concrete, a ramp was built at the North approach for the mixer, which was a Ransome 34-E single-drum paver. Batch trucks

backed up the ramp and unloaded in the paver skip. The paver dumped into 2-yd. Garbro floor hoppers, placed on Ford flat-bed trucks. Average concrete production of 20 cu. yd. per hour required five 2-batch trucks for the 7-mile haul. Two floor-hopper trucks were used on the near half of the bridge, and three on the far half.

Excessive loads were not deemed advisable on the old bridge, and the maximum load of concrete transported over it was one 7-bag batch (1.285 cu. yd.) Exceptional concrete strengths were developed with this mixture, by the way; 7-day cylinder tests ranged from 4,000 to nearly 6,000 lb. using regular portland cement.

The nearness of the old bridge (48 ft. c. to c.) allowed the new bridge to be constructed with a minimum of floating equipment. The old 20 ft. roadway was kept open to traffic at all times.

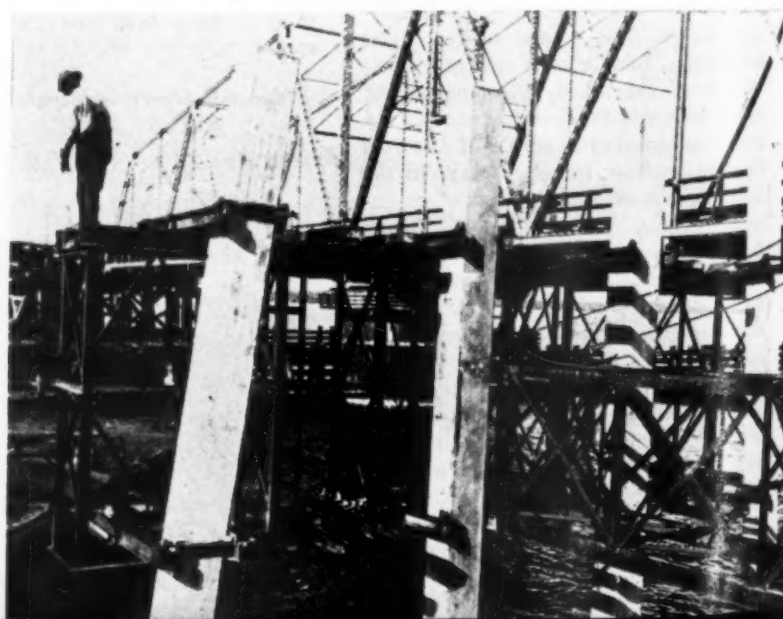
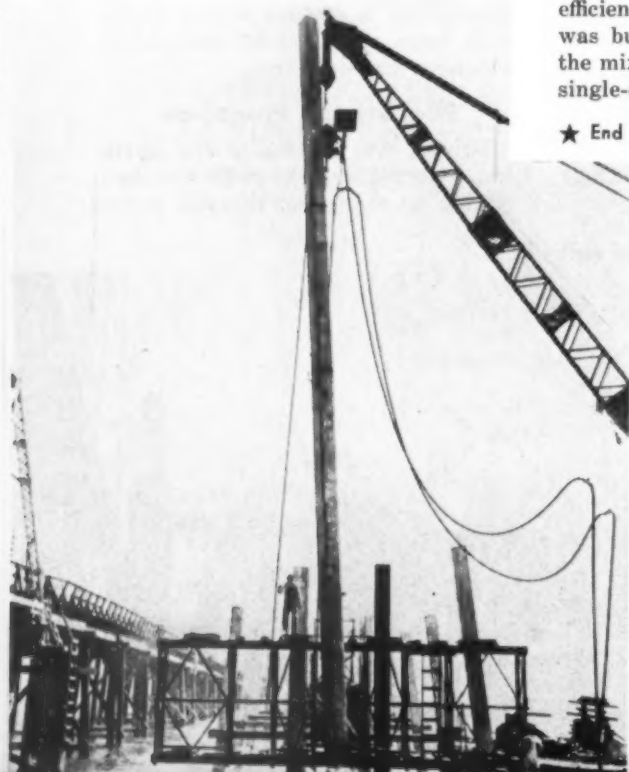
The new bridge's navigation channel is located 300 ft. north of the old structure's swing span and channel.

Each typical cap required 7.24 cu. yd. of concrete; 772 cu. yd. for all pile caps. Capping started 3 weeks after driving the first pile bent. Cap forms were placed and stripped with the aid of two wood barges. On the higher bents, scaffolds on the piling aided in placing and stripping forms.

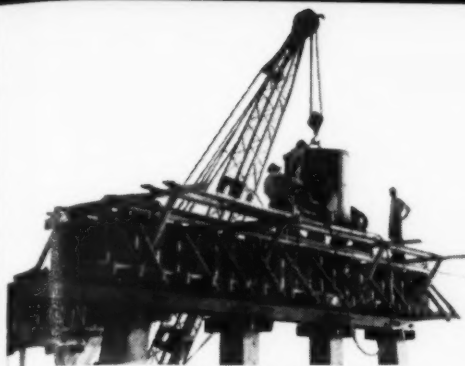
### Aluminum Runways

Materials were hauled along the old bridge and taken over to the caps on temporary connecting trestles. Concrete was placed in the forms on the majority of the bents from hand carts via a specially designed 450-lb., 28-ft. long aluminum runway, one end supported on the old bridge and the other end on the cap form. Cap pours were

★ End view of pile driving template showing derrick barge







★ Pouring highest pile caps using crawler crane and 1-yd. bucket on barge

usually made when 6 to 8 forms were completed. Two such runways were used, one in service and the other being moved ahead to the next cap. A few men could move a runway in 10 minutes using a light hand-operated derrick.

Because of the increasing differential in elevations of the two bridges, the grade on the aluminum runways became too great between bents 35 and 68 to make this method of concrete placing economical. To cast the higher caps, a 4-ton stiff-leg derrick on a 24' x 80' wood barge was used to handle concrete from the old bridge to the cap forms.

The first cap was concreted in mid-August. Final completion, except for the four bents in the old navigation channel, was accomplished by January, 1949. The early completion of caps provided protection for the piling and allowed greater flexibility in placing deck forms.

### Falsework Easily Reset

The deck consisted of a 7¼-in. slab on four T-beams, with curtain walls at panel ends. Facia work was somewhat simplified in that the curb section was only 2' 6" wide. Concrete required for one deck span was 50.6 cu. yd. Total deck concrete was 5,271 cu. yd.

Falsework for deck forms consisted of eight sets of collars placed on each pile cap. (See photo.) Each collar was made up of two pairs of 5" x 5" x ¾" steel angles, or an equivalent section, with one pair over and one pair under the cap, locked together with two 1-in. bolts. The top members overhung 6 in. on each side of the cap, and from each of these a 1½-in. bolt was suspended. Each pair of 1½-in. bolts supported another pair of angles which formed a seat for the steel beam falsework. The angles which formed the seat could be adjusted in elevation by the bolts supporting them, which allowed for very accurate setting of the forms and falsework when placed.

Eight I-beams (18-in., 54.7-lb.) bolted together to form four pairs, were used to support the forms; 6 x 6 transverse timbers were placed on the I's at 2' 6" centers and cleated in place. With falsework a single unit,



★ Another view of the special pile driving template

after the initial usage it was possible to strip and reset it with minimum time and labor. When the first two sets of falsework had been set in place on bents at the North approach, deck forms prefabricated previously in the form yard were set up on the falsework, and work on the decks went forward on an assembly-line basis. Forms were built of ¾-in. plywood and 2 x 6 rough lumber. The pan sections which formed the T-beams and under side of deck slab were built in 8-ft. lengths, and designed to collapse away from the concrete and be lowered with the falsework when stripped. Facia forms were designed so that they, too, could be stripped as a unit and lowered with the pan forms and falsework, making the stripping of forms and falsework a single operation.

Concrete was taken from the hopper trucks and placed in the forms by hand cart. Average span pour was three hours. On panels where it was not possible to transport the concrete over the new bridge from the paver, the old bridge and aluminum runways were again used.

### Special Finishing Screed

A 35-ft. longitudinal screed was used for finishing. Designed and built of aluminum for this job, it cut finishing labor by 50% over customary methods. A belt was used for final finish.

Fourteen days' curing was required before stripping. To strip falsework

a 26' x 80' wooden barge was fitted out with four A-frames, one on each corner (Photo). Two of the A-frames were built with telescopic booms to clear the old bridge when taking the barge out from under forms and falsework.

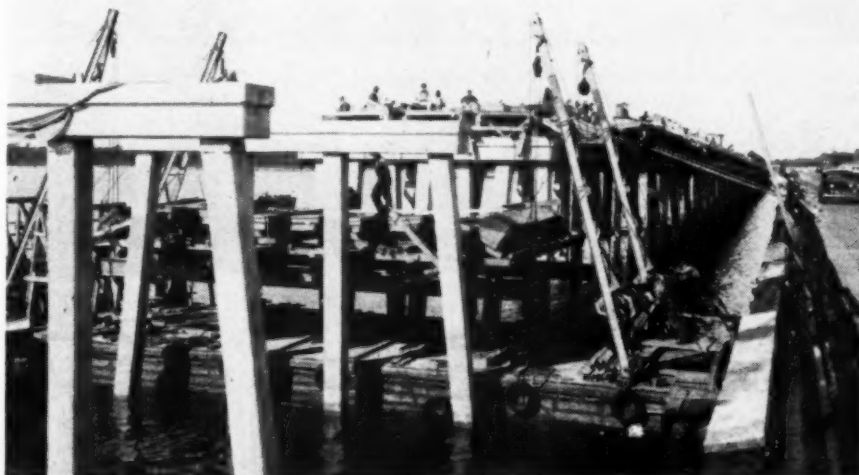
Two cradle beams were suspended between the A-frames to carry the falsework. The beams were raised by means of a 5-ton Beebe hoist mounted on each A-frame. When the cradle beams were brought up tightly under the falsework, the angle seats for the falsework suspended from the collars could be removed and the forms and falsework lowered.

Setting the forms and falsework in place was merely a reversal of the foregoing procedure. Stripping and resetting forms and falsework in place was accomplished in 8 to 10 hours; an average of 3½ panels were stripped and reset per week.

Deck operations were carried on at several points simultaneously, so that when weather delays held up concreting operations, it was possible to cast as many as six deck panels in one week and in many cases two in one day.

### Bascule Span Details

Each of the two bascule piers is supported on two foundations which join just above the water. Each foundation required a cofferdam, and enough sheet piling and timber wale frames were built to allow working on two



★ "A" frame barge; deck form being raised to position



★ Floor hopper on truck used in transporting concrete. At left one of the aluminum runways used between old and new bridges



★ Mixer loading floor hopper, for hauling concrete over bridge



★ Pouring pile cap by Buggy concrete for cap over aluminum runway

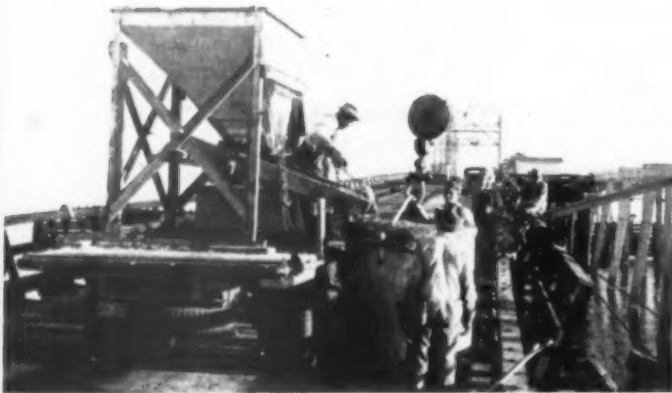
foundations at a time. MP 116 sheet piling 45 ft. long was used, and there were two 12"x16" and one 12"x12" wale frames with 12"x12" struts at the

quarter points in each cofferdam. The cofferdams were 16 ft. long, 40 ft. wide, 30 ft. deep. A 30'x100' steel barge with a stiff-leg was used.

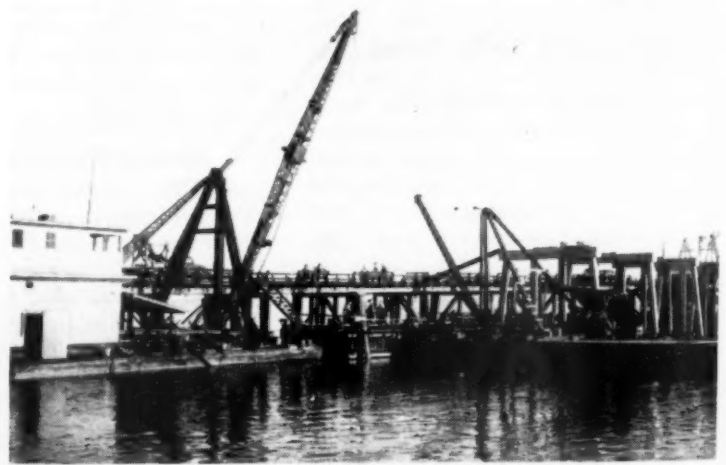
Water depth of about 20 ft. deep necessitated excavating the last 10 ft. in the cofferdam. Upon completion of excavation, a plank grid was placed on the top wale frame and 96 untreated timber piling 45 ft. long were driven in the cofferdam to water level. To avoid underwater driving, piles 20 ft. longer than necessary were bought. The cut-offs were later sawn into 8x8's for the detour bridge.

Concrete for the seals was transported along the old bridge, placed in a drop bucket, and swung over to tremie pipes in the cofferdam by the barge derrick. The pipes were kept at proper level by a second derrick barge. Cofferdams were de-watered after seven days. Sheet piling was driven in reverse position with single interlock to reduce concrete placed beyond the foundation payline. No difficulties were experienced because of this in de-watering, which was done by two 6-in. and two 4-in. pumps in 4 to 6 hours per cofferdam. The bottom of the seal was at elev.—30 ft.; the top, at—20 ft.; top of footing, at—16 ft. Pier shafts were concreted in three lifts to a point above the water floating line, the lifts requiring 224 and 90 and 200 cu. yd. of concrete, respectively.

The remainder of the pier was cast in 4 lifts to elev. 29.15 ft. The first two lifts, with 200 cu. yd. of concrete, were poured by handcart from the old



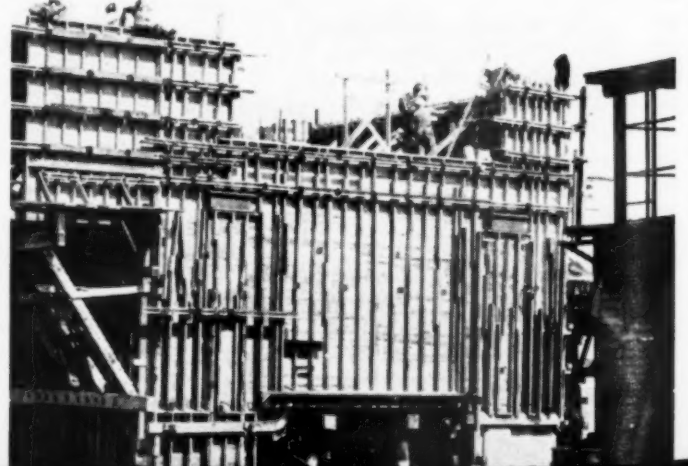
★ Loading concrete bucket from truck for seal pour



★ Pouring seal in bascule pier cofferdam

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★ Forms for North Bascule Pier in right foreground. Stripping barge seen in distance



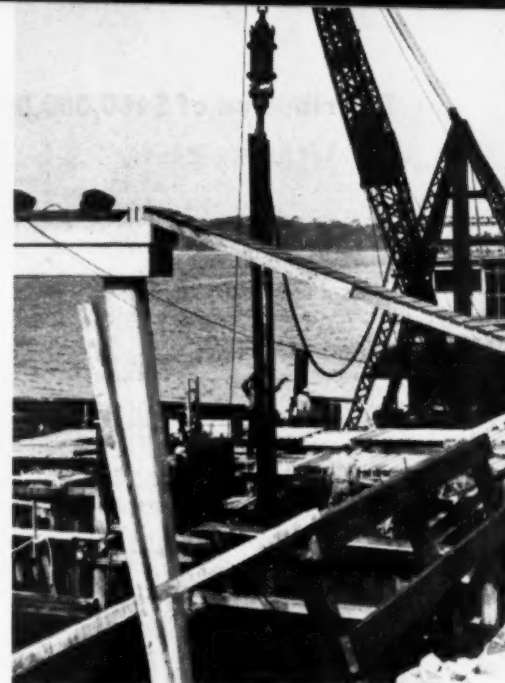
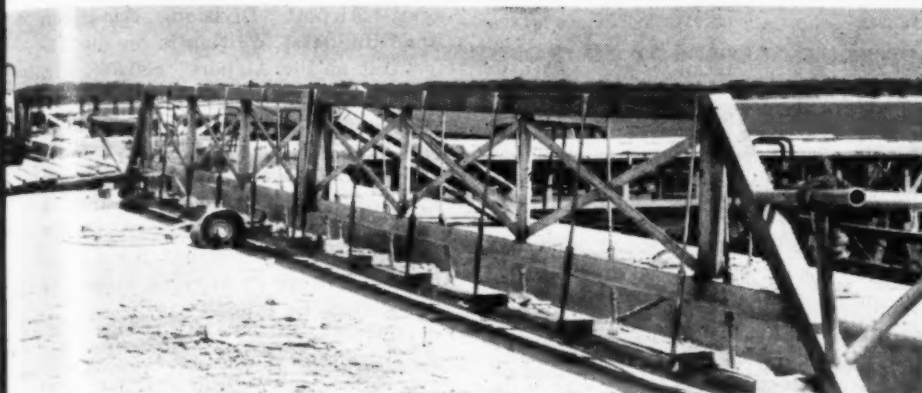
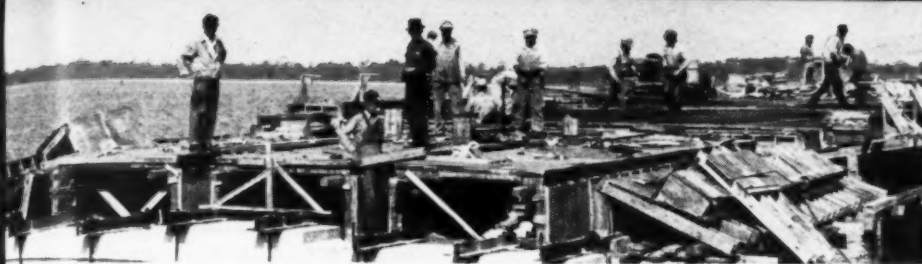
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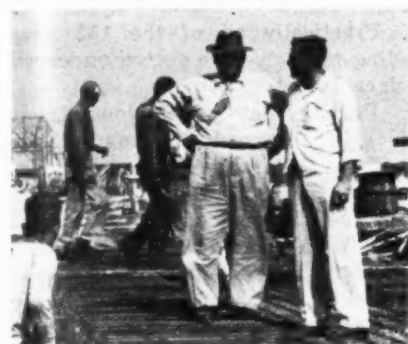
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★ Erection of forms for floor slab. Note cap clamps, described in the article

★ Longitudinal aluminum screed weighing 450 lb., handled by six men to finish the concrete on floor slabs



★ Harry Evans, engineer in charge, is standing on steel talking to I. C. Tobey, carpenter superintendent

bridge. The last two lifts, 110 cu. yd., were cast from a derrick barge. The four lifts took 7 weeks, the North pier being finished Feb. 25, allowing 3 days for stripping forms and beginning steel erection scheduled for March 1, on the North pier.

While building the first shaft, the second cofferdam was sealed. Total time for foundations and two shafts for the North pier was 3½ months. By working two shifts, the South bascule pier was completed in 28 days which permitted the erection of steel to continue on schedule.

### Traffic Hauling Sequence

Structural steel and bascule machinery were brought from railroad yards to jobsite by barge and erected by a crane on a 30 x 100 ft. steel barge. The steel for each half of the bascule was erected in 27 days. In two months from the starting date, all steel and machinery work had been completed except for final balancing of counterweights.

To minimize falsework necessary to support counterweights concrete, the

counterweights were cast in two lifts. Some 110 cu. yd. of concrete, consisting of 85-lb. blocks, was placed in each counterweight.

With steel erection starting on the south bascule pier on April 1, operations had to be closely coordinated to meet the scheduled completion date. The first step was the placing of the three concrete spans adjacent to the South pier. These spans served as a landing for the detour bridge crossover to the old bridge between the South pier on the new and the swing span of the old bridge. In mid-April, work was started on the detour bridge, consisting of two bents with 70-ft. wood

piles, and the old bridge was also given three strengthening bents.

### Completion Sequence

As the old bridge was still open to traffic, only half the landing of the detour bridge could be built at a time. During April erection of steel members and flooring on the draw span was completed, and on May 2 traffic was routed over the North half of the new bridge and detoured to the South half of the old bridge.

On May 2, the Sound was temporarily closed to water traffic, and the portion of the old bridge opposite the bascule

(Continued on page 81)



★ Placing first girder, North Bascule leaf

★ Bascule Span in closed position





## Distribution of \$450,000,000 Federal-Aid for Fiscal Year 1951

State	Sums Apportioned For			Total
	Federal-Aid Primary System	Secondary or Feeder Roads	Urban Highways	
Alabama	\$ 4,263,373	\$ 3,367,109	\$ 1,157,921	\$ 8,788,403
Arizona	2,884,918	1,995,026	232,926	5,112,870
Arkansas	3,440,900	2,767,936	495,958	6,704,794
California	8,037,278	4,602,788	7,216,292	19,856,358
Colorado	3,575,649	2,406,251	829,510	6,811,410
Connecticut	1,242,466	682,562	2,316,659	4,241,687
Delaware	974,531	649,688	181,297	1,805,516
Florida	2,904,565	1,945,506	1,421,220	6,271,291
Georgia	5,017,556	3,828,985	1,441,091	10,287,632
Idaho	2,471,847	1,728,865	188,176	4,388,888
Illinois	7,798,916	4,189,809	8,449,887	20,438,612
Indiana	4,741,346	3,179,477	2,723,787	10,644,610
Iowa	4,913,437	3,513,955	1,414,525	9,841,917
Kansas	4,956,553	3,481,866	983,721	9,422,140
Kentucky	3,772,305	3,050,595	1,154,581	7,977,481
Louisiana	3,052,605	2,281,103	1,360,748	6,694,456
Maine	1,717,684	1,238,176	498,017	3,453,877
Maryland	1,635,712	1,045,942	1,590,418	4,272,072
Massachusetts	2,619,300	702,068	5,875,054	9,196,422
Michigan	6,057,777	3,663,373	5,048,623	14,769,773
Minnesota	5,345,224	3,682,804	1,960,081	10,988,109
Mississippi	3,672,990	3,016,921	533,179	7,223,090
Missouri	5,910,889	4,049,345	2,799,683	12,759,917
Montana	4,051,448	2,767,823	273,348	7,092,619
Nebraska	3,944,850	2,785,550	695,466	7,425,866
Nevada	2,562,973	1,717,361	53,853	4,334,187
New Hampshire	974,531	649,688	422,019	2,046,238
New Jersey	2,547,926	927,560	4,911,404	8,386,890
New Mexico	3,231,155	2,236,700	228,567	5,696,422
New York	9,621,543	3,792,806	16,681,818	30,096,167
North Carolina	4,877,462	3,990,309	1,326,007	10,193,778
North Dakota	2,948,287	2,125,686	190,644	5,264,617
Ohio	6,940,178	4,083,099	6,698,622	17,721,899
Oklahoma	4,490,377	3,298,766	1,197,791	8,986,934
Oregon	3,325,613	2,269,150	720,430	6,315,193
Pennsylvania	8,151,917	4,676,549	9,344,128	22,172,594
Rhode Island	974,531	649,688	997,786	2,622,005
South Carolina	2,720,661	2,244,168	581,082	5,545,911
South Dakota	3,109,459	2,214,296	197,342	5,521,097
Tennessee	4,271,311	3,282,043	1,415,352	8,968,706
Texas	12,683,893	8,933,674	3,966,153	25,583,720
Utah	2,265,127	1,508,492	385,353	4,158,972
Vermont	974,531	649,688	188,251	1,812,470
Virginia	3,671,363	2,846,104	1,324,938	7,842,405
Washington	3,142,071	2,127,490	1,303,754	6,573,315
West Virginia	2,212,327	1,857,719	717,603	4,787,649
Wisconsin	4,792,360	3,246,382	2,358,393	10,397,135
Wyoming	2,470,864	1,676,874	118,209	4,265,947
Hawaii	974,531	649,688	349,535	1,973,754
Dist. of Columbia	974,531	649,688	1,018,601	2,642,820
Puerto Rico	992,609	1,010,309	741,447	2,744,365

### \$450,000,000 Federal-Aid Apportioned

Sums apportioned to the states from the \$450,000,000 fund authorized by the Federal-Aid Highway Act of 1948 for the fiscal year 1951 were announced Sept. 11 by Secretary of Commerce Charles Sawyer. Normally the apportionment would not be made until December, but was made early at the request of several states desiring to initiate urgently needed improvements.

The apportionment for the fiscal year 1951 became available on Oct. 1 and will remain available to the states until June 30, 1953.

Amounts apportioned to the states, District of Columbia, Hawaii and Porto Rico are shown in the above table.

### Ten Cent Parking Meters Planned for Chicago

The Chicago Park District which has jurisdiction over Michigan Avenue is considering the installation of 10c per hour parking meters on Michigan between 26th Street and Walton Place—through the busiest part of this famous thoroughfare. According to Victor G. Hofer, traffic engineer, no change is contemplated in present parking regulations which prohibit rush hour parking and allow one hour daytime parking.

Other parking meters with 5c rates are planned for eight outlying locations along the park district's boulevards, but the Michigan Avenue installations will be the first experiment. Profits from the meters will go for policing and maintenance of parking system.

## \$205,000,000 for Airports This Year

The Federal-aid Airport Program, put under way only slightly more than two years ago, now involves development of more than 830 airport projects, notes Walter R. Macatee, Manager, Airport Division, American Road Builders. Writing in his monthly "Out at the Airport" release, Mr. Macatee answers a critic of the program's supposed slowness by saying that construction of many civil fields has been aggressively prosecuted; 339 fields at 298 locations having been completed. Other fields, at the beginning of the current fiscal year (July 1), were in varying stages of completion, as follows:

No. of Projects	Percent Completed
339	100%
173	76 to 99%
43	51 to 75%
54	26 to 50%
64	1 to 25%
158	Not started July 1

Practically all of the 158 straggling projects have gotten under way since July 1.

Development of numerous airports is going forward at many locations without Federal assistance. Including carry-over of 1948 Federal-aid funds, the 1949 program of Federal-aid projects is estimated to involve \$110,000,000. This does not take into account funds expended on non-Federal-aid civil airport projects during the year. The total 1949 airport program, in dollar-volume, is estimated to be \$205,000,000, as follows:

Federal-aid funds	\$ 55,000,000
Sponsors' matching funds	55,000,000
Non-Federal-aid Airport Projects	60,000,000
Armed Forces' airfields	35,000,000
<b>Total</b>	<b>\$205,000,000</b>

### Grading and Paving

The airport program hence constitutes a substantial segment of public construction, even though it may not be as glamorous as it was once regarded, notes Mr. Macatee. Civil Aeronautics Administration figures on the airport construction dollar, exclusive of hangars and terminal buildings, showing that more than 90% is for items similar to highway development, as follows:

Item	Proportion
Grading	51.40%
Paving	38.70%
Lighting	5.40%
Radio	1.10%
Miscellaneous	3.40%

The current National Airport Plan foresees even greater development ahead. CAA's forecast of needs during the next three years calls for 2794 new airports and improving 2183 existing airfields, at an estimated \$1,115,300,000.

## ★ A New Conception of the Roadbuilder's Job

Highway engineers and contractors do more than just create new roadbeds of soil and stone and concrete and bituminous materials.

In each mile of road modernization they put a new, solid underpinning beneath the giant business we call highway transportation. This 30 billion dollar per year enterprise, bringing paychecks to nine million workers and accounting for one-seventh of the total U.S. economy, will continue to flourish and expand or will soon level off or languish, according to the speed with which the present seriously dilapidated highway system is rebuilt.

### New Economic Meaning

Roadbuilders are the "plant maintenance men" of highway transportation, in the words of Public Roads Commissioner Thomas H. MacDonald. By keeping roads patched and by replacing worn-out roads with new, wider, safer, freer flowing roadways, they are greasing the wheels that haul most of our food to market and inter-lace every city and hamlet with a flow of goods and services and inter-communication that dwarf all previously known forms of transportation.

A still broader interpretation comes from Wilfred Owen of the Brookings Institution, whose remarkable report, "Automotive Transportation Trends and Problems", is just published. This report emphasizes the economic role of highway transportation with new eloquence and documentation. Owens has done perhaps the best job yet in showing how an adequate investment in modern highways more than pays for itself in lowering the cost of highway transportation.

We are all aware of the mounting deficiencies in our roads. They have been wearing out physically faster than they have been rebuilt for years, beginning long before the war. Even more serious is their functional obsolescence—more on this presently. Engineers who have made mile-by-mile appraisals of road conditions agree that at least \$4 billions must be invested yearly over a decade or more, if we hope to catch up with the job. We've come from a low of \$0.4 billion annually during the war year 1944, climbing only this year to a new postwar high of \$1.7 billions for new road construction, which, due to inflation, still doesn't equal our best prewar years.

Congressional leaders are taking a new look at the business stimulation that follows good roads, the industrial activity created in the roadbuilding process, and the effect of progressive highway policies in underpinning the nation's economy generally. In July in connection with the President's mid-year message, the Joint Congressional Committee on the Economic Report dug into the subject. Under chairmanship of Senator Joseph C. O'Mahoney of Wyoming, this committee

questionnaired the state governors and highway departments on highway needs. Tallies from 34 states revealed a combined need for \$20 billions for road construction and repairs. When all reports are in, the total may run to \$25 or \$30 billions.

In commenting to the press and the public, Senator O'Mahoney said, "Everyone is aware of the depreciation of the American road system during and since the war, but few, I am sure, appreciate the tremendous backlog of essential work that has piled up." More significantly, he noted that this backlog will "afford an unmeasured market for business and industry."

### Federal vs. State Funds

Thus we see that our national leaders are approaching the task of enacting new federal-aid highway legislation with a keen awareness of their responsibility. There is talk of increasing the ratio of federal funds to state matching money from the present 50-50 formula. One thought is that the \$11 billions needed for the 37,200-mile Interstate System might come wholly from federal funds. A billion per year aid rate is also discussed. Meanwhile supposedly rich states, such as Michigan, are having a hard time matching federal funds even at the present rate. State governors are coming to Washington with tin cups, and so are numerous mayors, whose cities plead poverty when matching funds for urban highways are required.

If Congress in 1951 sees fit to liberalize the federal-aid law, fine and dandy, providing we are all willing to see constantly growing federal meddling in local road matters. The Editors of ROADS AND STREETS, however, reflect the feeling of many highway leaders that the future of roadbuilding lies principally with sound state financing. Let each state build its own roads for its own people, basing its plans on reasonable federal aid without waiting to see what Washington may do.

### Spotlight on States

While Congress surely will extend the wise legislation and financial aid begun in 1916, it can't build the country's whole highway system, and so what are the state legislatures going to do about it? Nearly all legislatures have failed dismally in this "legislative" year of 1949 to dig up the new revenue sources needed for their respective roads. A few raised the gas tax a cent or so, and vehicle licenses have inched up here and there. Brilliant exceptions were North Carolina and Massachusetts with bond issues of \$200 and \$100 million, respectively. But most legislatures, Illinois being the most conspicuous, either couldn't get together or didn't even try.

In other states the toll road idea has gathered momentum as a means of sidestepping the politically painful task of raising highway user taxes.



### Why Fear the Motorist?

But why should the Solons fear the motorist as they do? The Brookings report also can be thanked for spotlighting another fact; namely, that John Q. Public pays only 4/10 cent per mile in gas taxes and license fees for the privilege of driving a car that costs him a thousand dollars a year, more or less, to own and operate. If we were to *double* the gas tax rate—as should be done to offset inflation since most present rates were set—John Q. would still be getting a bargain.

The answer is that *both* federal and state highway revenues must be increased substantially. Coupled with the highway need studies now in progress or completed in many states, there must be new studies of ways and means of raising the money equitably. The answer may be higher gas taxes and license fees, or a bond issue, or toll roads for deluxe service between metropolitan centers, or a combination—including, of course, the stopping of diversion to non-highway use and excessive scatteration to local use.

Time's a-wasting. Speed is all the more necessary because of a little realized fact we've saved here to the last. Nearly one-fourth of all the 42 million vehicles on the road today are at the scrapping age and are being rapidly replaced by new, faster cars and faster and heavier trucks. If you think your old, narrow, shoulderless, sharp-turning, sightless-hilltop roads with their weak, bottleneck bridges are outmoded today, you "ain't seen nothin' yet." Over 6 million new vehicles being spewed out this year will bring highway obsolescence into sharper focus. Watch the congestion and the slaughter from here on.

Yes, a new conception of the roadbuilder's job has emerged. Highway builders are builders of good times and insurance agents of a good future. But the most important roadbuilders aren't the practicing engineers or the contractors. They're the political leaders in your state who will take the time to become fully posted on highway matters and give your state the modern roads it needs.

—Harold J. McKeever

## ★ State Good Roads Associations Necessary

*We know that our highway system is inadequate. We know that twenty billions of dollars are needed to provide adequate facilities. We know that the legislatures and the federal congress will not appropriate one-fourth of this amount annually, yes, even one-tenth of it. So what?*

So I say, now is the time to once again organize good roads associations in each of the states. We have a major job on our hands; that of creating public demand for highway appropriations in annual amounts that can be

accomplished by the contracting fraternity.

It does some good, of course, for us to know our deficiencies, but it does no good unless we do something about it. We might well follow the lead, statewide in this country, of the International Road Federation in Latin-America and other countries.

We need the support of good roads associations. The American Road Builders' Association can help out in Washington, but local associations within the states are required to prop-

erly inform the citizenry on highway problems. The close personal contact that a state good roads association can give to local people, local industry, local groups produces in the minds of these people the greater confidence that, at this time, is so necessary.

To prepare for the next legislative and appropriation periods good roads associations in each state should be active right now. We recommend this action for immediate consideration.

—V. J. Brown

## ★ Editorial on Brookings Report

(From the New York Times)

A study by the Brookings Institution serves to confirm anxieties that have been felt of late by all concerned with transportation over the road, either of passengers or goods. The study finds that most of today's roads are not adapted to the requirements of heavy volumes of high-speed traffic resulting from shifts in population and a notable and growing trend from urban to suburban areas. It reveals that in the past declining unit costs of automotive products made it possible to increase levies supposedly dedicated to highway purposes. More recently these technological savings have no longer been applied to meet expanding need for better highways. As a result, the high cost of poor

roads has begun to overtake the economies realized through better cars.

Recommendations of the study include, first, better use of existing highway facilities and sources of revenue already available, with emphasis on improved highway administration and more effective traffic engineering, and second, a better balance between expenditures for automobiles and those for roads. With an unprecedented high of 40,000,000 motor vehicles using the roads and streets, there is an increase of 20% over pre-war. Road construction costs meanwhile have greatly increased, and these costs are complicated by the high price of merely maintaining the present system in adequate condition. Little is left to pay for new construction so sorely needed.

State-wide studies of the problem, initiated from the safety angle but aimed also at the economic problems of congestion, have been made by the Automotive Safety Foundation. Such studies aim to make a truer evaluation of the importance of specific roads and road improvements. If the highway problem is to be solved at all, and not wind up in an impasse in which the motor vehicle as a necessity rather than a luxury is robbed of much of its economic value, it must be done on such an orderly basis as this. In the present economic situation of the country as a whole, the question is not one of increasing budgets and expenditures, which are already high, but of properly allocating funds and making sure that they are applied where they will do the most good.



## ★ Mild Winters Don't Necessarily Cost Much Less

About this time of year highway and street department people are speculating on what kind of a winter they'll have on their hands, beginning how soon. Last winter's freak weather is still a subject of conversation. West of Omaha, hell broke loose and the financial drain on road and street budgets is still being felt.

But while the West was having its worst winter in 50 years, eastern states basked in a Mediterranean climate, with snow equipment getting its lightest work-out in years.

If the Easterners learned any one thing, it was that a mild winter doesn't necessarily save much money.

The amount of winter rainfall and moisture in the ground was higher than usual last winter, and the number of freeze-thaw cycles in such areas as, for example, around Saginaw, was abnormally high. Pavements were damaged more extensively than usual in some places, and the spring thaw was up to normal or worse. Equipment rental bookkeeping declared no holiday. Chloride and abrasive costs were higher in some cities, lower in others; no clear pattern here.

But one pattern is clear. Equipment and operators must be available all through a winter, regardless. Science hasn't yet taught anyone but

certain city councilmen to see into the future, these gentlemen feeling certain after communion with the all-high that they can get along with their old, inadequate snow-plowing, loading and sanding equipment through one more winter.

Others aren't so smug. It isn't too late to acquire additional trucks which will pay off in year-around use in any event; or to get sanding equipment and de-icing chemicals that will save lives and keep traffic going; or to purchase new plows and loaders that will repay their cost in maintenance and labor saving, not to mention better service in emergencies.

## ★ Michigan Answering Motorist's Prayer

Bravo to the Michigan state highway department for its program of re-signing thirteen main routes, as described elsewhere in this issue. And a cigar also to the Public Roads people cooperating.

The motorist still has a bad time on the road due to the antiquated or dilapidated signs along the way, if any. Some states do a better job than others, of course, and some states have routes that are better marked than others, thanks to progress since the war. We understand that over a million individual road signs and markers were erected last year, counting renovated signs as well as new ones.

But the task has only just begun. We have a national uniform code, and growing acceptance of it by various

state and local bodies. From here on the motorist should see more and more of those new style signs that are as they should be: (a) familiar and standard in design, (b) readable, night and day, (c) clear in meaning, and (d) numerous enough to keep reassuring the driver that he is on the right road.

Especially needed are larger and faster-reading signs telling a motorist which way to turn at Y junctions, circles and intersections. The writer made two wrong turns recently while traveling from New York to Washington, because of Y junction signs so small you're right on them before you can read them.

One detail of the Michigan changes might be questioned. Signs are being raised higher from the ground, which

is all right, but also placed farther off-side in the shoulder, which may be outside the range of headlamp vision.

### Most Will Flunk

An old suggestion is repeated here to all highway engineers and officials responsible in any way for roadway planning, design and maintenance: Have someone not familiar with your roads drive them at night, in an ordinary car with average lights, at ordinary top speeds, and keep putting himself in the position of the customer. Make it a rainy night preferably, and the more traffic the better for the test. Even some of your newer roads will flunk this test badly as to safety features generally and signs in particular.

## ★ Congratulations ...

To the Cleveland "Press" for its campaign on "Lost Lanes," dramatizing the traffic tie-ups caused by illegal parking in busy blocks. . .

To the Brookings Institution and Wilfred Owen for the fine report on the economic significance of automotive transportation and highways. . .

To Dan Brock of Johnson, Drake & Piper, a contractor's superintendent (see first article in this issue) who took the time to tell how his outfit built the Pensacola Beach bridge. . .

To the American Public Works Association and particularly to its headquarters staff and program chairman and speakers, for one of the best annual Congress meetings in years. . .

To AGC president Adolph Tiechert,

Jr. for his blunt words at the contractor group's midyear board meeting, on the subject of government encroachment on private enterprise. . .

To the Pennsylvania State Highway Department for awarding \$23 million in new contracts in one month, thus catching up after a tardy start this year. . .

To the Pennsylvania Turnpike Commission and its contractors for forging ahead of schedule in grading, structures and paving—in the 1939 tradition. . .

To the New Jersey Turnpike Authority engineering staff and consultants for record speed in performing a year's plans preparation work in 120 days on its 118-mile, \$184,000,000 project. . .

**T**HE White House has directed Secretary of Commerce Sawyer to report by Dec. 1 on the major policy issues that will have to be resolved "in order to achieve maximum effectiveness and consistency of Federal programs in the transportation field."

Bureau of Public Roads representatives were among those who met with Secretary Sawyer recently to set machinery in motion to meet the White House request. Also represented were the Defense Establishment, Civil Aeronautics Authority, Civil Aeronautics Board, the Interstate Commerce Commission, the Maritime Commission and the Treasury. The timing of the request may indicate that transportation recommendations by President Truman can be expected at the second session of the 81st Congress next year.



★ "Pull in at the office before going after another load, Bill," phones Walt Eastman, equipment superintendent, to a driver via time-saving 2-way radio

**1,500,000 tons of raw stone being hauled 26 miles by fleet of 35 to 45 large semi-trailers. Three-year job, with schedules gradually increasing to 4500 tons daily**

**A**N example of an efficient over-the-road trucking operation serving a large construction job is that of B. R. DeWitt, Inc., of Pavilion, New York. This company, which is allied with the well known roadbuilding firm of Potter-DeWitt Corp., is subcontractor on aggregate stone delivery for Mount Morris Dam Builders, which has the prime contract with Corps of Engineers, U.S. Army, for the \$21 million Mt. Morris Dam in western New York state.

The aggregate and concrete production methods for this project were described in Aug. and Sept. '49 *ROADS AND STREETS*, respectively. The dam will require 900,000 cu. yd. of concrete, most of it mass concrete, during the three working seasons of 1949, 1950 and 1951. Stone for all aggregate sizes, including the 100% manufactured sand, is being furnished by General Crushed Stone Co. from its quarry at LeRoy, N.Y. Stone supplied to the trucks is graded from 7 in. down to  $\frac{3}{4}$  in.

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★ Brockway truck with Heil body equipped trailer, unloading at the aggregate plant. Note another trailer opposite, and space in front available for third truck to dump simultaneously



# Radio-Directed Trucks

## Supplying Aggregate Stone to Mount Morris Dam

In all, some 1,500,000 tons of stone will be required at a rate gradually increasing from the 3500 tons (70 rail cars equivalent) daily average of the past summer, to an anticipated 4500 ton peak next summer. This large tonnage, coupled with the considerable hauling distance, 26 miles, necessitated a highly organized and well equipped delivery operation. The B. R. DeWitt organization was a natural choice for this job, since it was already set up in business with ready-mix concrete plants at several nearby towns and with a large fleet of construction trucks headquartered at Pavilion, N.Y., en route between the dam and the quarry.

### Truck Equipment Used

Hauling for the dam project is being performed by large 10 or 14-wheel semi-trailer dumping units, about 35 being in operation during the summer. The trucks, all gasoline engined, included 28 Brockways and several GMC's, Whites and other makes. Trailers included Fruehaufs and Kentuckys, and dump bodies included 8 Heils, 5 Gar Wood, 5 Daybrook and 16 of the new 23-ft. Winch Lifts, 10 single and 5 tandem axle made at Minden, Louisiana. The make-up of the fleet naturally has varied from week to week, since the machines used are part of the contractor's 107 owned trucks.

The average pay load is around 15 tons, depending on the axle distribution and truck equipment. During the time these notes were taken, each truck was making seven round trips

per 14-hour day, one driver staying at the wheel throughout. A round trip of 52 miles requires from 100 to 120 minutes, depending on traffic en route, and delays in weighing, loading and dumping. Each driver was clocking about 350 miles per day, and the whole operation at summer peak represented 12,000 to 13,000 truck-miles, or 200,000 payload ton-miles daily. The drivers, incidentally, are union men, most of whom are regular drivers for DeWitt. They are paid by the hour and the long hours and steady work has brought them "good money."

Loading time is reduced to a momentary pause, thanks to the efficient operation of the loading tunnel under the stockpile at the quarry. This tunnel, through which trucks are driven, consists of a 144-in.-diam. corrugated pipe served by a large ventilator fan.

### Conservative Loading

Over-the-road hauling is aided by the existence of good black-top surfacing on the state roads traversed. Because of the heavy traffic, some

★ "OK, Walt," replies driver Bill Smith, who adds, "the crushing plant is shutting down here for an hour, so you'd better tell the other boys"



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delays were expected en route. Drivers are chosen for their good safety records. By agreement with the state highway authorities, loads have been kept on the conservative side and axle load limits strictly adhered to, in the realization that even small overloads with 500 daily truck passages would soon cause costly roadbed damage. Conservative loads also have helped keep down operating and repair costs on the trucks, and as a further advantage, rock spillage along the way has been practically eliminated. The writer followed the trucks several times over the route, and saw only one small stone on the pavement.

The entire matter of large-scale construction hauling over public highways is recognized here as a serious economic problem, since accelerated roadbed deterioration is inevitable under the best of circumstances. The state is understood to expect some wear and tear.

The loads are weighed at the dam. The drivers then maneuver into any one of the three dumping positions at the large receiving hopper, where the aggregate processing begins.

### Radio Control "Indispensable"

Radio communication has paid off in a big way in directing hauling operations. About half of the 35 trucks on the dam work have mobile Motorola units in the cab, the contractor having 28 such units installed in his trucks on this and other jobs in the area. Drivers are in constant touch with the dispatching office at company headquarters, and also with any of the company's four material plants at nearby towns. In commenting on the Motorolas, fleet superintendent Walt Easton said that short-wave radio telephone equipment has saved so many headaches that he "wouldn't know how to operate without it."

Break-downs have been few, with tire trouble also at a minimum. Radio has made it possible to get a repair truck quickly to any truck in distress, and to keep constant tab on all units, resulting in waste time in maximum utilization of equipment. One



★ GMC truck with Winch Lift unit at the crusher. Another Winch Lift on far side. These trailers have a 23-ft. wheel base



★ Overhead grease lines help speed greasing and transmission changes, for which two stalls are provided in a room adjoining the main shop. Lubricant storage tanks were built by the shop crew

repair truck is assigned full-time to the dam fleet.

Paper work involving drivers is simply handled. A checker stationed at the scales records the payload and enters the load, truck number, time of day, date, etc., on a form. The drivers deposit these form slips in a "mail box" mounted on one of the gasoline pumps at headquarters when he stops to gas up or lay up his truck for the night.

The DeWitt management isn't missing any bets on truck maintenance. Each driver has his own truck, as a rule, and no one but him uses that truck. He is made responsible for its care, and he personally greases his own equipment, performing prescribed daily and weekly servicing tasks and reporting them systematically. A card system keeps tab on

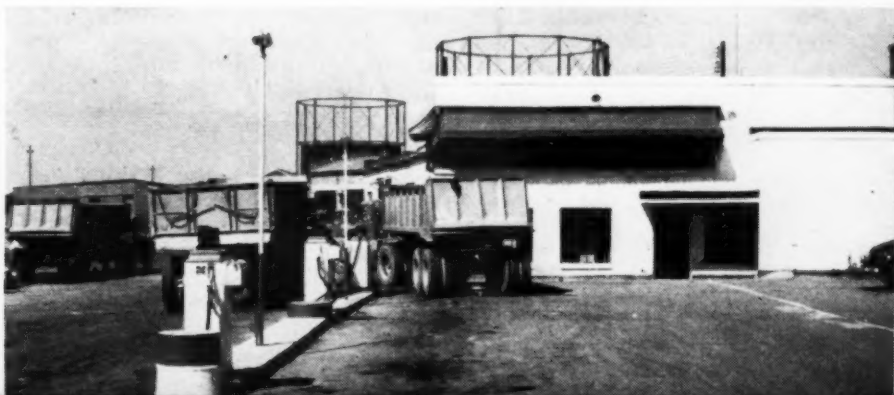
each truck, so that at proper intervals the truck and trailer get all attention recommended by the manufacturer. Drivers report necessary repairs, which are done at night in the company shop, or on down time if more serious.

### Complete Shop Facilities

No description of the DeWitt organization would be complete without a few words about its shop and yard. The facilities, located adjacent to the B. R. DeWitt and Potter-DeWitt headquarters office, consists of two shops, one for heavy construction equipment and one for trucks.

Fronting the property is a large paved service station, not unlike a commercial station catering to trucks. Four fuel pumps are located along a

★ In the DeWitt yard. Modernistic building is the office. The four gas pumps are in line for trucks entering or leaving yard. Note padded drum for receiving litter, and "mail box" on each pump where drivers deposit load slips and other records







★ One of several transmission and rear-end stands employed on the main shop floor



★ Shop superintendent Charles Thompson

single axis, pumps being positioned well apart in a line so that as many as six drivers can re-fuel at a time either into or out of the yard.

Back of the pumps, the yard fronts onto a 100' x 160' shop which is equipped for complete rebuilding of motors and bodies. Under shop superintendent Charles Thompson, a crew of 10 mechanics and helpers, plus a tire man and 3 or 4 men on

pick-up or field repair trucks, work on a 2-shift or even around-the-clock schedule. During winter overhauling time, drivers also are assigned to shop work.

The shop is equipped to do its own line boring and lathe work, and has a well supplied stock room where complete new or overhauled replacement motors are stored for all makes and models of company-owned trucks. Also stocked for replacement are such items as exhaust tail pipes, carburetors, generators, fuel pumps, and other critical parts or assembled units.

The company's entire fleet has 900 to 1,000 tires on the road at any one time, but tire repair facilities are kept to a minimum. A room adjoining the main shop is used for tire changing, and an outside tire repairman comes in once a week to inspect tires and take tires away for recapping or replacement. Tires are stored in a separate building.

## Watch Off-Road Tire Pressure

By Mark Coons

Field Engineer, R. G. LeTourneau, Inc.

**N**UMEROUS inquiries arise in the field regarding the proper tire pressure to be used for the various sized tires used on LeTourneau equipment. These questions generally run along the line of "How low (or how high) can the tire pressure be set for economical operation?"

Before attempting an answer, let's look into the conditions on a typical earthmoving job. Generally speaking, each complete cycle is composed of four parts: loading, hauling, dumping, and return.

Underfoot conditions in the cut and fill are usually poor, with the material in a loose condition, the surface rutted, and rolling resistance high. Of necessity, the machines travel at a reduced rate of speed. Under such conditions

it is possible to lower tire pressures and gain more tractive power and flotation.

The haul road, on the other hand, is generally well maintained, and the surface compacted, thus allowing the machines to travel at an increased rate of speed. High tire pressures, within the limits of Tire and Rim Association recommendations, will produce the best results under such conditions.

If the tire pressures are kept low for the entire cycle, the tires will overflex, heat up, and wear unevenly while traveling at the high rate of speed on the haul road, thus decreasing tire life and increasing costs. If, however, tire pressure is kept high during the entire cycle, difficulty will be encountered in many cases while loading, due to lack of flotation and decrease in tractive effort. Thus, it appears as

though the best tire pressure would be one that falls between the two extremes.

Below is a table showing tire pressures for various sized tires used on LeTourneau equipment, which experience has shown are the best "compromise" pressures for the widest range of applications:

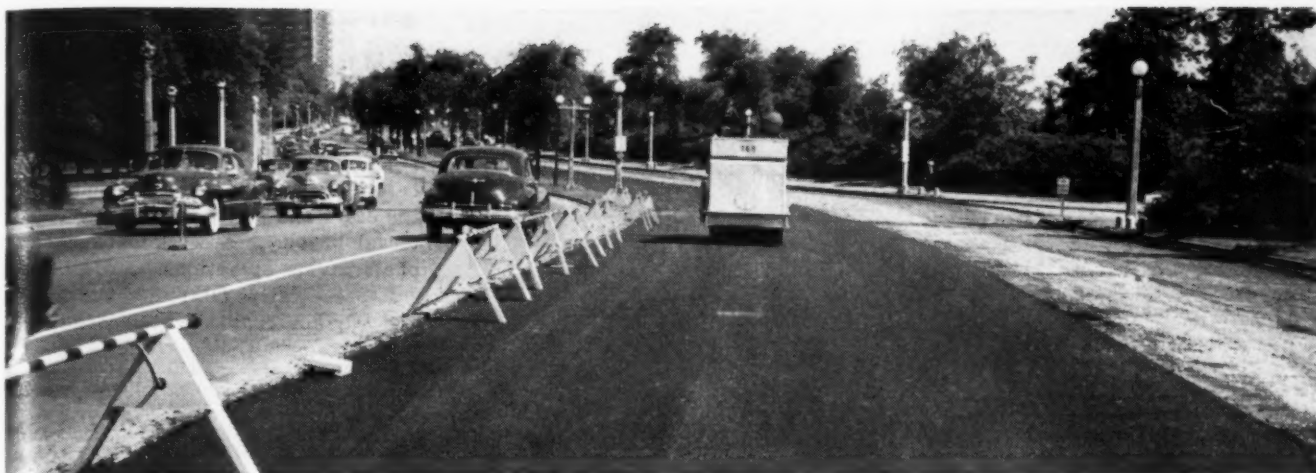
D Roadster Tournapull		
(14:00x32) 16 Ply Pusher Loaded		55 lb.
(14:00x32) 16 Ply Self Loading		45 lb.
(14:00x32) 12 Ply Pusher Loaded		50 lb.
(14:00x32) 12 Ply Self Loading		45 lb.
(18:00x25) 12 Ply		30 lb.
D Roadster with Dozer Blade		
(14:00x32) 16 Ply Only at 55 lb. pressure		
C Roadster Tournapull		
(21:00x25) 20 Ply		40 lb.
A Roadster Tournapull		
(24:00x29) 36 Ply		65 lb.
(27:00x33) 30 Ply		50 lb.
(30:00x33) 28 Ply		35 lb.
(30:00x33) 40 Ply		50 lb.
C Tournadozer		
(21:00x25) 16 Ply		25 lb.
A Tournadozer		
(30:00x33) 28 Ply		35 lb.
W Carryall		
(24:00x32) 24 Ply		45 lb.
FP Carryall		
(18:00x24) 16 Ply		40 lb.
LP Carryall		
(18:00x24) 16 Ply		40 lb.
LS Carryall		
(16:00x20) 16 Ply		45 lb.

These various pressures are, of course, for average operating conditions. When a particular job has a short haul with reduced travel speeds and poor underfoot conditions, often times the tire pressures may be reduced to advantage. In extremely poor conditions, it is best to contact the nearest tire distributor for recommendations on the safest minimum pressure.

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★ The going ranged from soft fluffy sand to hard compacted haul roads and tough clayey material on Nello Teer's Annapolis Parkway job—as seen this past September. One of his fleet operations was highly "rubberized." Medium tire pressures were maintained to meet a wide range of conditions. One of Teer's electric Tournapulls is shown being pushloaded by a Tournadozer





★ Lake Shore Drive in Chicago, north of Montrose, with the north-bound lane being repaved and the south-bound carrying two-way traffic. Binder course being rolled for one-half of width; barricades erected at point where landscaped center parkway is interrupted

# Paving for World's Heaviest Traffic

**Asphaltic mixtures found durable under heavy traffic volume were used in resurfacing north section of Chicago's Lake Shore Drive**

**By Walter H. Flood**  
Consulting Engineer, Chicago

**I**N June of this year the Chicago Park District replaced the old asphalt wearing surface laid on Lake Shore Drive from Irving Park Drive to Montrose Drive in 1927. This 22-year-old pavement was laid on a concrete base, and the work this year consisted of removing the asphalt surface down to the concrete and replacing it with a new hot mix asphaltic concrete.

For many years the old South Park District laid, almost exclusively, on the boulevards and drives under their jurisdiction, an asphaltic concrete type of pavement which was adopted by the Chicago Park District upon consolidation of the various Park Districts and has since been used with slight modifi-

cations as the standard for all construction measuring 2 in. thickness or over on all boulevards and drives throughout the entire Park system. Specially designed mixtures are used where conditions do not permit sufficient thickness to allow the use of the larger aggregate specified in the standard mixture.

The Park District standard asphalt paving mixture closely resembles the present Illinois State Highway I-11 specifications with respect to the gradation of the aggregate, but differs from the state specifications in the characteristics of the asphalt cement.

Since this portion of North Lake Shore Drive receives the heaviest passenger car and bus traffic numerically of any pavement in the world, amounting normally to 80,000 vehicles in twenty-four hours and occasionally reaching 120,000, all traveling at relatively high speed, great care was exercised in the design of the surface mixture so as to best withstand these conditions.

## Heavy Traffic Problem

Several factors must be taken into consideration in designing the mixture for the type of traffic on this section—the high speed of the cars, the relatively heavy weight of the buses, and the softening effect of oil dropping from crank cases, and diesel oil from occasional leaky tanks on the buses.

Slight amounts of gasoline will not damage the surface, since it evaporates rapidly, but lubricating and diesel oils will tend to soften the asphalt and increase the bitumen content to a point dangerously lowering the stability and resulting in serious displacement of the surface. It was necessary therefore to obtain an aggregate grading containing a low percentage of voids and maximum density, possessing high inherent stability, as well as a carefully controlled bitumen content capable of being slightly increased by the oil droppings, without affecting the stability and causing a distortion of the surface. Tests were run in the laboratory using various combinations of the aggregates available and different percentages of asphalt and the correct mix possessing optimum desirable values determined.

After the old asphalt surface was removed, it was found that the concrete base showed a number of irregularities and defective spots. After cleaning and priming the entire base, these areas were brought to even contour by filling with binder mixture, and a course of about 1 to 1½ in. of binder was then laid over the entire base. The thickness of this binder was somewhat variable due to irregularity of the base and in order to permit the 2-in. surface course to meet the existing gutter grade. After the binder was rolled and compacted to even contour, the surface course was laid approximately 2 in. in thickness, completing the pavement. Both binder and surface courses were spread by machine, and in order not to interfere more than

## Feature Section

### Bituminous Paving Practice

*The following 9 pages are devoted to articles on subject matter having to do with this important topic. Each of the articles contains data of value to both engineers and contractors.*





★ Large-capacity trucks were used to supply the asphalt, to reduce the number of trucks at the site

necessary with traffic, one of the two driveways, which are separated by a parkway, was paved and completed before tearing out the old pavement on the other and repaving, making an interval of about a week between asphalt paving operations.

Representative samples of the binder and surface courses showed the following compositions:

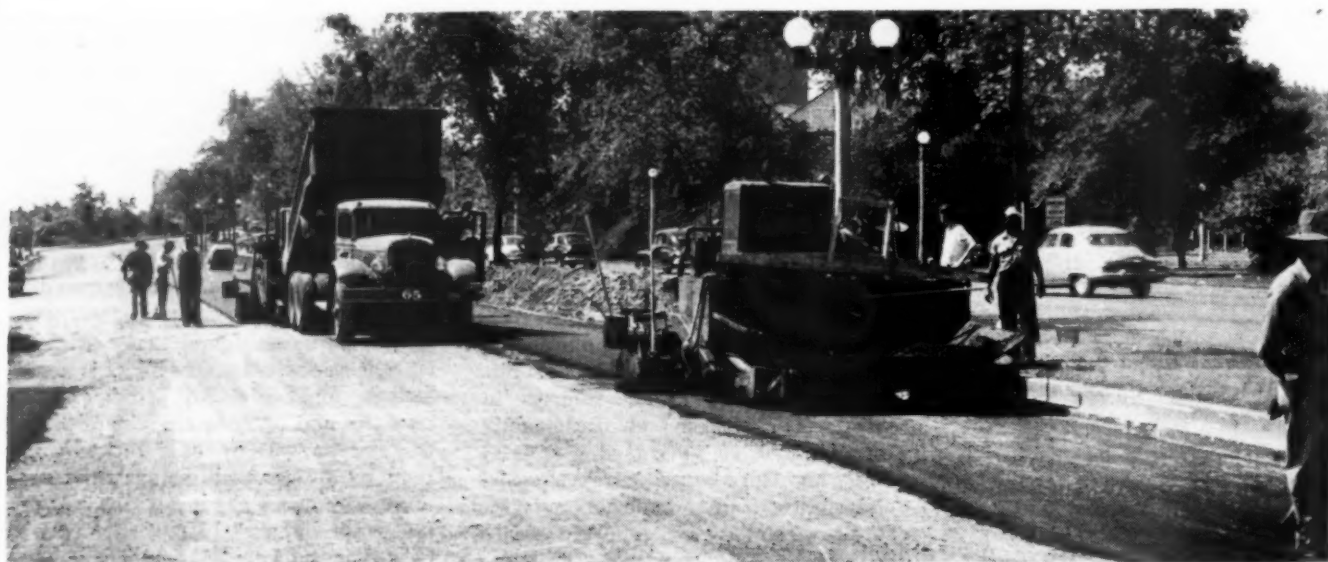
	Binder Surface	
Bitumen	4.9%	6.2%
Passing #200 mesh	2.5	7.7
Passing #80 retained on #200 mesh	2.5	9.8
Passing #40 retained on #80 mesh	9.3	12.5
Passing #10 retained on #40 mesh	12.9	11.2
Passing #4 retained on #10 mesh	11.4	15.8
Passing 1/2" retained on #4 mesh	29.00	36.8
Passing 3/4" retained on 1/2" mesh	23.2	0.0
Passing 1" retained on 3/4" mesh	4.2	0.0
Retained on 1" mesh	0.0	0.0

It is not customary to break down the binder mixture into so many gradations, but they are shown above merely for comparison with the surface mixture.

The asphalt cement specifications of the Chicago Park District for use with asphaltic concrete mixtures are similar to those of the City of Chicago and are separated into two classifications, "A" and "B", calling for a mixture of two parts of "A" and one of "B". The specifications for "A" are drawn to a



★ Blockading of an entire roadway permitted efficient, speedy placement. While necessitating the rerouting of traffic over parallel streets, it eliminated possible traffic mishaps and shortened the construction time, as compared to the alternate scheme of blockading only two lanes at a time



### Notes on Lake Shore Drive Reconstruction Methods

★ Two Barber-Greene pavers placed two lanes at a time, or half of a roadway. The north-bound roadway was completed first, then opened to traffic, the south-bound side closed for the full 2600 ft. distance. Traffic rerouting was a major problem entailing the use of a flanking service roadway and adjacent parallel streets to handle park rush-hour traffic.

Asphalt was placed by the White Construction Company of Chicago, using two Barber-Greene spreaders, three Buffalo-Springfield or Huber rollers and an assortment of trucks including Macks and Whites. A week (Monday-Friday) was needed to rip up the old

pavement on each roadway, clean the concrete base and place wedge material plus the binder and surface courses totaling about 12,500 sq. yd. The old pavement was pried up with a Northwest dragline, using the bucket teeth for loosening, a dozer to pile material, and a Traxcavator to load for removal. A heavy motor grader with scarifier teeth assisted asphalt loosening and removal, which required about 30 hours of work for a 2600 ft. roadway, 45 ft. wide, plus ramp roads. R. D. McLean is superintendent for the Chicago Park District boulevard system



heavier asphaltic base material than the "B". The "B" specifications are, with a few exceptions, similar to those of the Illinois Division of Highways. The penetration was 70 to 85 classification, and as used was about 75. The prime was 85 to 100 penetration, meeting the Illinois State Highway specifications, and was applied at the rate of approximately  $\frac{1}{2}$  gal. per sq. yd. on the concrete base.

The asphalt cement used on the work was Lion Oil Refining Company for the "A" asphalt, Shell Oil Company for the "B" asphalt, and Standard Oil Company of Indiana for the prime. A total of 3,078 tons of binder mixture and 2,651 tons of surface mixture was used on the project. Much of the binder was used to remedy the uneven condition of the concrete base.

Mention has been made of the heavy traffic conditions on North Lake Shore Drive. Traffic counts confined to only the morning and evening rush hours show over 7,500 vehicles passing over this pavement at each of these short periods, which gives some idea of the heavy concentration of traffic which this pavement must successfully withstand day after day. Our experience indicates that no other type of pavement can equal in satisfactory performance the record of the boulevards and drives laid by the Chicago Park District under these specifications for the class of traffic to which they are subjected.

## Rise of American Wages— No Other Nation Can Match It

By Halbert P. Gillette

During the last 10 years average factory wages in America have risen from about \$24 to \$54 a week, and therefore are about two and a quarter times what they were in 1939.

In the same period the average cost of living has risen about 70% and is therefore 1.7 times what it was. Hence a week's wages would buy about one and a third times as many retailed goods and services now as a decade ago.

This is a greater increase than has occurred in any decade since 1849 when the first census was taken of factory employees and annual payrolls. At that time the annual wage was \$247 or \$4.75 a week. Hence, weekly wages are now more than 11.3 times what they were in American factories a century ago.

No statistics as to the cost of living in 1849 are available, but Senate Committee Report No. 1394, published in 1893, gives a wholesale commodity price index or general price level for

years back to 1840. Since retail prices have usually followed wholesale prices rather closely, a fair measure of the advance in real wages (measured in the goods wages will buy) is had by dividing the average weekly wage by a wholesale commodity price index. In this way it is found that the factory real wage in 1949 is four and a fifth times that in 1849.

The Senate Committee report above mentioned states that in 20 trades the average length of the working day in 1840 was 11.4 hours; in 1860, 11 hours, and 1890, 10 hours. Since the working week was six days, about 67 hours was the weekly schedule in 1849 as compared with 40 in 1949.

Hence, although working only three-fifths as many hours weekly, more than four times as many goods are purchasable with the average week's wages.

Wages in general have risen about the same percentage as factory wages.

The increase in money wages is primarily due to an increase in currency in circulation. Between 1849 and 1939 factory wages per year usually averaged about 20 times the per capita currency in circulation. At present, however, annual factory wages average only 15 times the per capita currency which is \$185. Therefore I expect to see an increase of about one-third in money wages in the next few years.

Our enormous increase in average wages during the last hundred years is mainly the result of applied science under our American system of competitive free enterprise. No other country can match this record.

## Fred Everett Retires

Frederic E. Everett, state highway commissioner of New Hampshire since 1915, has retired, and has been appointed consultant to the new commissioner, Maj. Gen. Frank D. Merrill, U.S.A. (retired).

New Hampshire has had only two state highway commissioners since the department was founded. Arthur W. Dean was the first, remaining in this office for about a year when he resigned and was succeeded by Mr. Everett.

Mr. Everett is a member of the American Society of Civil Engineers. He has been president of the American Association of State Highway Officials and of the State Highway Officials of the North Atlantic States. He has been chairman of the Maine-New Hampshire Interstate Bridge Authority since its organization.

In 1930 he was a member of the American delegation to the 6th Congress of the Permanent International Association of Roads Congresses. In



F. E. Everett

1931 he became United States representative on the Permanent Commission of the International Association of Road Congresses. He received the honorary degree of Doctor of Engineering in 1946 from the University of New Hampshire.

## Burton Joins ARBA Contractor Division

Shipley D. Burton has been named field activities director of the American Road Builders' Association Highway Contractors Division. Announcement of Mr. Burton's appointment was made jointly by Nello L. Teer, Jr., Durham, N.C., president of the division, and Burton F. Miller, managing director, whom Mr. Burton will assist.

Mr. Burton's appointment is part of an expansion program of the ARBA. He will center his activities on giving additional service to highway contractors in the field and enrollment of new members.



Shipley D. Burton

A native of Salt Lake City, Mr. Burton began his association career as manager of the Utah Motor Transport Association. Mr. Burton has had a successful association career in the field of motor transport.

# Emulsified Asphalt

## Methods Using Road Mix Machinery

**By Al Day**

Chief Engineer, Bitucote Products, Division of  
Bridges Paving Co., St. Louis, Mo.

A combination of mechanical paver and emulsified asphalt was applied recently with satisfactory results on State Route 64 in Bedford County, Tennessee. The project, built by the state highway department's maintenance division, extended over approximately 26 miles from Wartrace via Shelbyville to the intersection of Route 11 near Lewisburg, Tennessee.

The old roadbed, which was originally mixed in place and sealed several times since, was left undisturbed to take advantage of the stability resulting from lengthy traffic compaction. In addition to the good base, drainage was excellent, but due to heavy traffic the road was rough and out of shape. A rather high crown in sections also made resurfacing desirable. In order to correct these conditions, a leveling course was put down to fill in holes and ruts and also to remove any waviness. This was followed by a finishing course which varied from 1 in. at the

Characteristic	Specification Limits	Typical Analysis
Viscosity at 77°F., Saybolt Furol.....	20 to 100 sec.	35 sec.
Residue by Distillation.....	not less than 55%	63.8%
Sieve Test.....	not more than 0.10%	Trace
Settlement, five days.....	5% maximum	.2
Modified Miscibility.....	not more than 4%	1.2
Cement Mixing.....	not more than 2%	Trace
Dehydration.....	not more than .60%	.71

Coating Test . . . Shall mix with and thoroughly coat a reference aggregate of dense graded type mixed under similar proportions of aggregate, moisture and emulsion as are employed in field conditions.

Residue Characteristics	Specification Limits	Typical Analysis
Penetration at 25 C. (77°F.) 100 g., 5 sec.....	100 to 200	165
Soluble in carbon disulfide.....	not less than 98%	98.9
Ash.....	not more than 1.5%	.78
Ductility at 25C. (77°F.).....	not less than 60 c.m.	60
Specific Gravity at 25C. (77°F.).....	not less than 1.01	1.017

center to about 4 in. on the edge. Approximately one mile of roadway was completed each day, covering an 18-ft. pavement in two single-lane passes.

### 750 Tons per Day

During all operations, mixing and laying was continuous. Rolling and compaction was begun within 45 minutes to an hour after laying. Finished surface was then opened to traffic after a light application of screenings was dusted over the surface to prevent traffic pickup. Aggregate used was stockpiled midway on the job and hauled to the job site where the paver was kept supplied without interrup-

tion. Top production ran about 750 tons per day, and required a little more than a tank car of emulsified asphalt. A Hetherington-Berner Paver was used. All work was completed under single lane traffic without rerouting. Approximate cost was \$0.26 per sq. yd.

The limestone aggregate used was clean and sharp with very little dust. Tennessee No. 16 stone was used.

This gradation resulted in a more open mix than is ordinarily used. Had Tennessee No. 17 been available, it would have provided a denser and tighter surface. Gradations of Tennessee No. 16 and No. 17 stone are:

Per Cent Retained On:		
Sieve Size	No. 16 Stone	No. 17 Stone
1"	0	0
3/4"	0-3	0
1/2"	-	0-5
3/8"	25-70	15-40
No. 4	80-100	60-95
No. 8	97-100	90-100
No. 14	-	98-100

Emulsified asphalt type SS-1 was used as the binder for both the leveling and wearing surface and sufficient emulsion was used to give approximately .45% by weight of asphaltic content. Furnished by the El Dorado, Arkansas plant of Bitucote Products, this emulsified asphalt would reveal the specification and typical analysis under closer examination.

The Bedford County project was under the jurisdiction of S. M. Squires, division engineer and J. B. Ramsey, division maintenance engineer of Chattanooga. E. S. Ezell, district maintenance engineer, supervised the daily operations, assisted by foreman Campbell of the mixing operations.

The speed and economy of application, coupled with the fact that traffic was not rerouted at any time while surfacing was in progress indicates the potential this system offers for road surfacing work throughout the country.

★ Rolling the mix approximately an hour after laying, and applying light application of screenings before opening to traffic

★ Single course pavement being laid, leaving single lane open to accommodate passing traffic







★ Job delay studies show great variation in the efficiency of truck movement in bituminous paving work

# Contractors' Hot-Mix Trucks

## Show Big Variation in Job Delays and Haul Speed

**Analysis of operating cycle of trucks hauling bituminous mix from plant to finisher on bituminous surfacing projects—Committee Report No. 9, Highway Research Board's Committee on Economics of Highway Construction and Maintenance Methods (Issued by the Board as Correlation Service Circular No. 80, August, 1949)**

**Table 2.—Operating Cycle Elements at the Plant and at the Finisher for Trucks Hauling Bituminous Mix on Bituminous Surfacing Projects**

Cycle element	Average time in min.
1. Time in plant, per trip	
a. Loading time	6.3
b. Maneuvering, weighing, covering the load, etc.	1.9
Total time in plant, exclusive of waits and delays	8.2
2. Time at finisher, per trip	
a. Discharge load	3.8
b. Maneuvering, exchanging, etc.	1.5
Total time at finisher, exclusive of waits and delays	5.3
3. Waits and delays, per trip	
a. At the plant	14.8
b. All other	3.8
Total waits and delays	18.6

The above items are largely self-explanatory. It is interesting to note, however, the average time required to obtain a load at the plant was 6.3 min. or 66% greater than the time required (3.8 min.) to discharge the load at the finisher.

**S**TUDIES made on trucks hauling bituminous mix from the plant to the finisher on bituminous surfacing projects show that the total time each truck spends at the plant, at the finisher, and in miscellaneous waits and delays averages more than one-half hour each round trip. The average road speed was observed to be about 30 mph.

These data were obtained from studies made by the Production Cost Unit of the Bureau of Public Roads on 9 different projects in the eastern and southeastern states over the past 20 months. About 95 trucks of various sizes and makes were observed for a total of 1,050 truck hours of operation. The average load carried by the trucks was 7.4 tons, and the average haul distance was 7.9 miles. Most of the hauling was done over surfaced roads that were well maintained.

Table 1 is a summary of data relating to the elements of the truck cycle.

Delays to the trucks during periods when the plant or the finisher is shut down because of repair, material shortages, moves, and so on, have been ex-

cluded when the shutdown is 15 minutes or more in duration.

The ranges shown in Table 1 are job averages. On several of the projects the variations from day to day frequently exceeded the ranges which are shown. For example, the haul speed on a particular job may have varied from 12 to 20 miles, but only the overall average for this job was considered when listing the entries in Table 1.

For the jobs which were studied, it was observed that, in general, the faster haul and return speeds were obtained on the jobs having the longer haul distances.

A partial breakdown of the times involved at the plant and at the finisher is shown in Table 2.

**Table 1.—Summary of Cycle Data Relating to the Operation of Trucks Hauling Bituminous Mix on Bituminous Surfacing Projects**

Element	Range	Average
1. Time in plant per trip, excluding waits and delays	3.8-16.1 min.	8.2 min.
2. Time at finisher per trip, excluding waits and delays	3.0-7.9 min.	5.3 min.
3. Waits and delays per trip	10.6-26.7 min.	18.6 min.
4. Total time constant (sum of items 1, 2 and 3)	22.0-50.3 min.	32.1 min.
5. Haul speed, loaded	16.3-37.6 mi.	27.8 mi.
6. Return speed, empty	22.3-41.8 mi.	32.3 mi.



# A Procedure for Designing Flexible Pavement and Base Mixtures

Requiring only simple graphic application of data, the proposed test procedure outlined in the following is one of the results of extensive airport runway investigation in Canada. The method was presented by Norman W. McLeod, Engineering Consultant, Dominion Department of Transport, Ottawa. This condensed summary should serve to acquaint the practicing engineer with the principles involved. For a more extended discussion the reader is referred to the Proceedings, 1948 meeting, Asphalt Paving Technologists; to "Roads and Bridges," Dec., 1948; and to Highway Research Report 4B, 1948 Supplement, "Airport Runway Evaluation in Canada, Part 2."—Editors.

By Col. V. J. Brown

Associate Editor, Roads and Streets

A TEST procedure which may be classified as a rational method for selecting base course materials and for designing bituminous pavement thicknesses, has resulted from a phase of the airport runway design investigation of the Canadian Department of Transport.

Steps in the development of the method are outlined and discussed briefly as follows:

1. Samples are tested in triaxial compression, and corresponding values of vertical load and lateral support are measured for failure conditions.
2. The data are plotted in the form of a Mohr diagram, Fig. 1.
3. From the resulting straight line Mohr envelope, Fig. 1, the values of cohesion  $c$  in p.s.i. (pounds per square

inch), and angle of interval friction  $\phi$  are determined.

The Mohr diagram provides a fundamental basis for defining the term "stability" as applied to granular and cohesive materials in general, and to flexible base course and surfacing materials in particular. For any given value of lateral support  $L$ , a group of these materials can be arranged in order of increasing stability according to their capacities for carrying greater applied vertical loads  $V$ . Consequently, for the equilibrium conditions of stress established by the Mohr envelopes for a number of materials under comparison, for any specified value of lateral support  $L$  the most stable material is that for which the value of  $V-L$  is greatest.

4. By reference to the Mohr diagram, cohesive and granular materials

can be conventionally divided into three fundamentally different groups, purely cohesive, purely granular, and those materials which have both cohesive and granular properties.

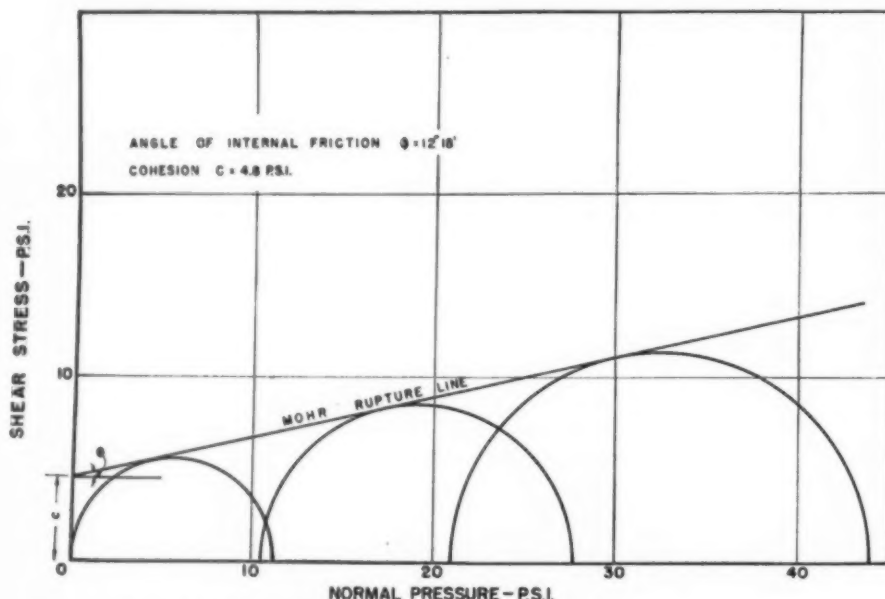
5. To provide a step by step understanding of his method, Mr. McLeod worked out a mathematical equation of stability, and plotted the corresponding stability diagram for each of these three groups of materials.

6. To illustrate the use of his method he has outlined the sample calculations required to determine the minimum value of cohesion  $c$  for purely cohesive materials, the minimum angle of internal friction  $\phi$  for purely granular materials, and the combined minimum values of both  $c$  and  $\phi$  for materials with both granular and cohesive properties, which are needed in each case to carry a vertical load  $V$  of 150 p.s.i., when the lateral support  $L$  is 50 p.s.i.

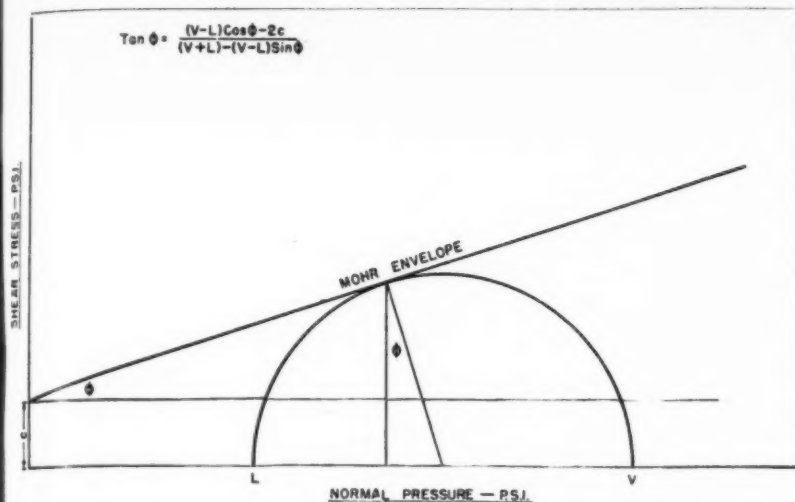
7. The most common soil materials at the earth's surface are probably those with both cohesive and granular properties, and it is to this group that bituminous mixtures belong. Fig. 2 illustrates the basis for the development of the general equation of stability for these materials, and Fig. 3 indicates the nature of the stability diagram that results for different values of vertical load  $V$  and lateral support  $L$ .

8. Fig. 4 is the stability diagram for materials with both cohesive and granular properties, that is required for solving the problem of supporting a vertical load  $V$  of 150 p.s.i., when the lateral support  $L$  is 50 p.s.i. Only those materials with combinations of cohesion  $c$  and angle of internal friction  $\phi$  which lie on or to the right of the curve labeled  $V-L = 100$  p.s.i.,  $L = 50$  p.s.i., will have the necessary stability. Those materials with combinations of  $c$  and  $\phi$  that lie to the left of this curve would tend to be unstable, and unsatisfactory under these particular conditions of vertical load and lateral support.

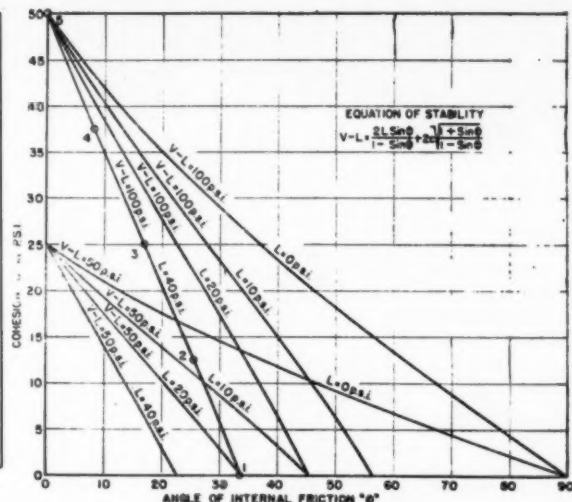
By testing questionable gravels, sands, or other base course materials of the inferior stability, in triaxial compression, and plotting the co-ordinates of their corresponding  $c$  and  $\phi$  values on a stability diagram like that



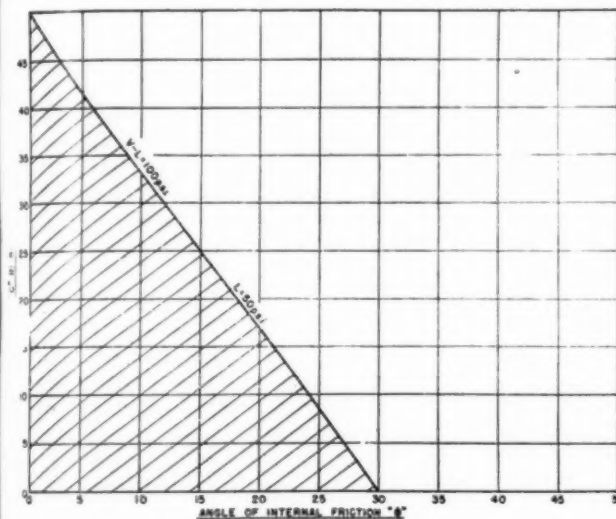
★ Fig. 1. Typical Mohr diagram for triaxial compression test



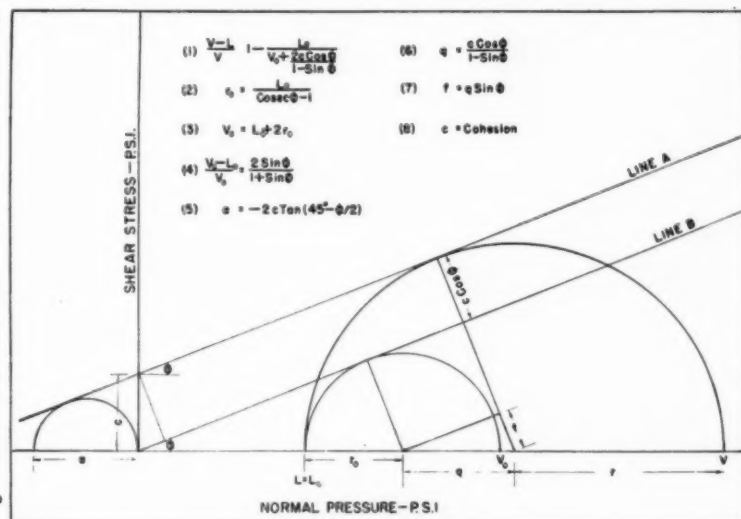
★ Fig. 2. Trigonometrical relationships for Mohr diagram for materials having positive values of  $C$  and  $\phi$  in triaxial compression



★ Fig. 3. Stability diagram in terms of  $C$ ,  $\phi$ ,  $L$  and  $(V-L)$  for materials having positive values for  $C$  and  $\phi$  in triaxial compression



★ Fig. 4. Stability diagram in terms of  $C$ ,  $\phi$ ,  $L$  and  $(V-L)$  for materials having positive values for  $C$  and  $\phi$  in triaxial compression



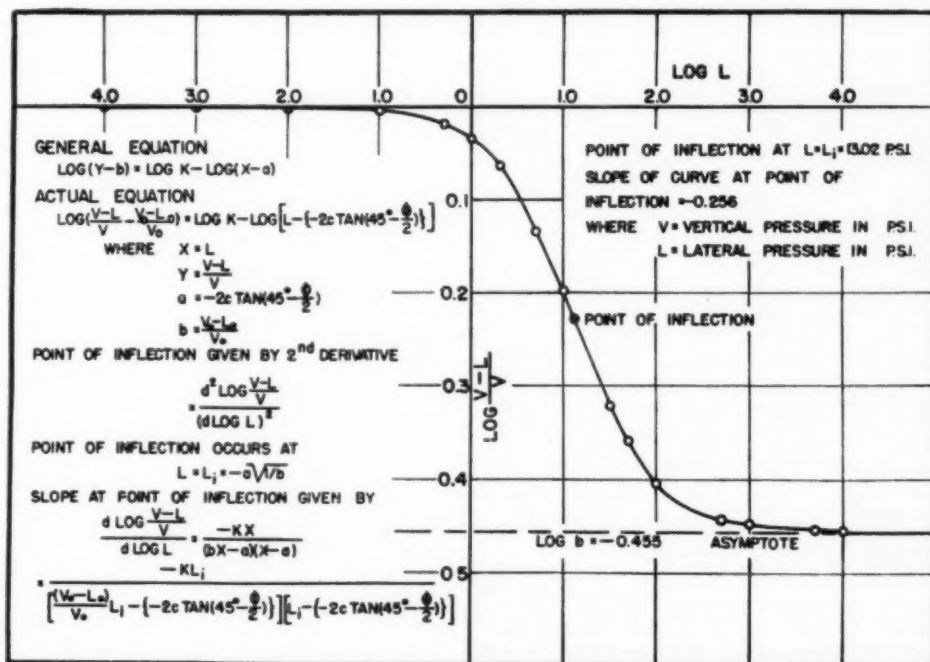
★ Fig. 5. Diagram illustrating certain geometrical relationships for triaxial compression test data

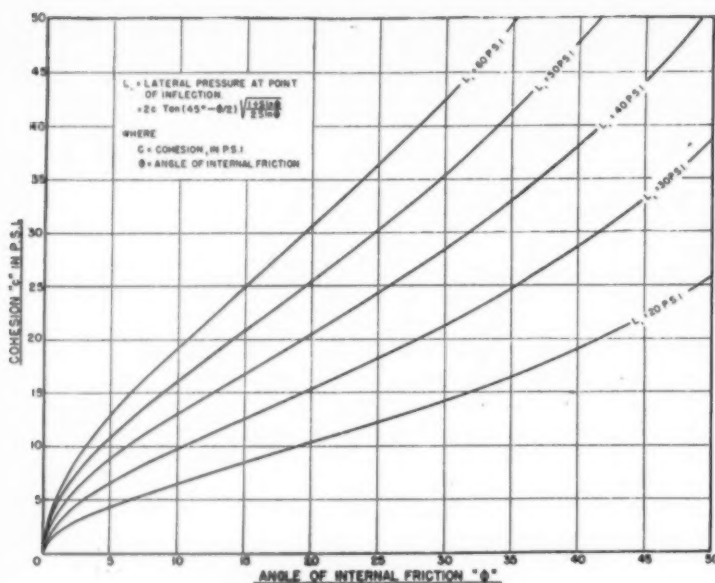
★ Fig. 6. Log of ratio  $\frac{V-L}{V}$  versus log  $L$  for triaxial compression test

of Fig. 4, in which they would fall in the shaded area, their deficiencies become immediately apparent. The problem with regard to correcting the inferior stability of any given base course material then becomes largely one of economics, as to whether its  $\phi$  value should be improved by incorporating a good granular material, or its  $c$  value improved by adding a suitable binder such as clay, bitumen, portland cement, etc., or whether both a binder and a granular material should be added.

By means of the procedure just outlined, the stabilities of soil-bituminous mixtures can be determined and compared directly with those for granular base course materials on a pounds per square inch (p.s.i.) basis.

The procedure represented by the stability diagram of Fig. 4 is satisfactory for the selection of base course materials. However, it is not entirely satisfactory for the design of bitu-





★ Fig. 6A. Relationships between cohesion "c", angle of internal friction "φ", and lateral pressure at the point of inflection "L" for triaxial compression test

minous paving mixtures, because it would permit the use of materials with even zero cohesion. It is common knowledge that gravel base courses which contain no binder of any kind develop washboard and other indications of instability under the particular types of stresses to which the surface layer is subjected. Experience has shown that the surface layer must contain a binding material to give it cohesion.

Consequently, before a stability diagram like that of Fig. 4 can be utilized for the design of bituminous mixtures it must be modified to provide sufficient cohesion *c* to enable surfacing materials to be stable under the particular types of stresses to which they are subjected by traffic. The next step in the development of bituminous

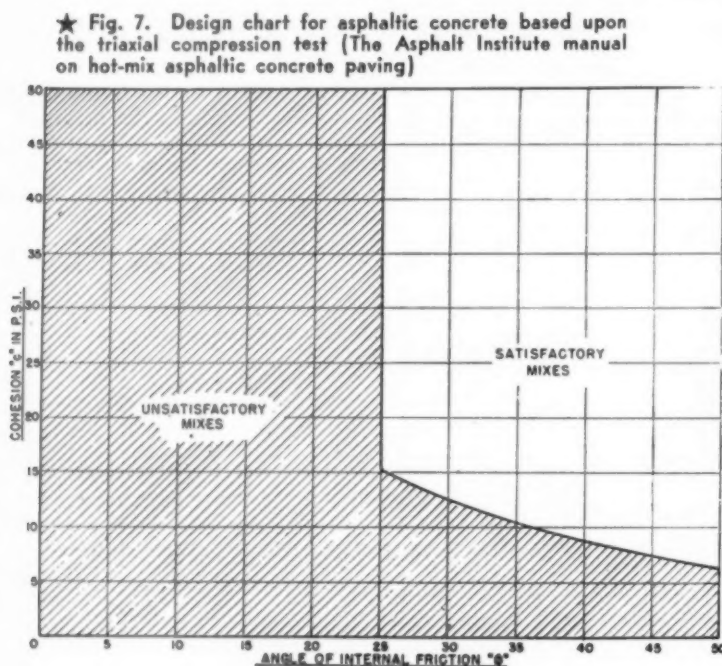
mixture design on the basis of the triaxial test therefore, consists of developing a method which will indicate the minimum amount of cohesion *c* that each bituminous paving mixture must have.

By testing a large number of bituminous mixtures of satisfactory and unsatisfactory service performance, the minimum values of cohesion *c* could be determined empirically. It happens, however, that the mathematical properties of the Mohr diagram can be employed to calculate minimum values for cohesion *c* that are in reasonable agreement with the results of experimental studies.

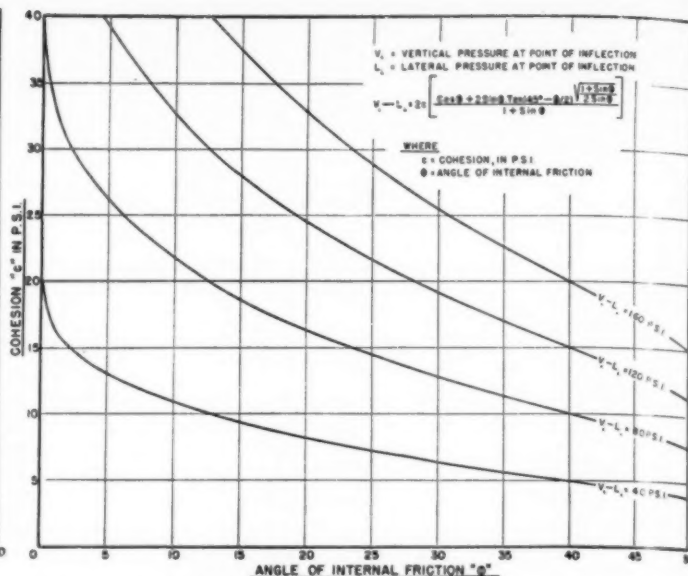
9. To establish these minimum values of cohesion *c*, the geometrical relationships of the Mohr diagram illustrated in Fig. 5 are employed.

10. By plotting  $\log \frac{V-L}{V}$  versus  $\log L$  for any given Mohr envelope, the reverse curve of Fig. 6 is obtained. From the relationship of Figs. 5 and 6, the value of the lateral support *L* at which the point of inflection in Fig. 6 occurs, can be calculated. This particular value of lateral support *L* is designated by the symbol *L<sub>i</sub>*. The corresponding value of vertical load *V* is designated by *V<sub>i</sub>*. For any one Mohr envelope, that is, for any one combination of values for *c* and *φ*, there can be only one value for *L<sub>i</sub>*, and one value for the corresponding *V<sub>i</sub>*.

11. Simple mathematical equations have been worked out from which the values of *L<sub>i</sub>*, *V<sub>i</sub>*, and *V<sub>i</sub>-L<sub>i</sub>* can be calculated for any Mohr envelope. Fig 6-A is a graph of curves for different values of *L<sub>i</sub>* in terms of *c* and *φ*.

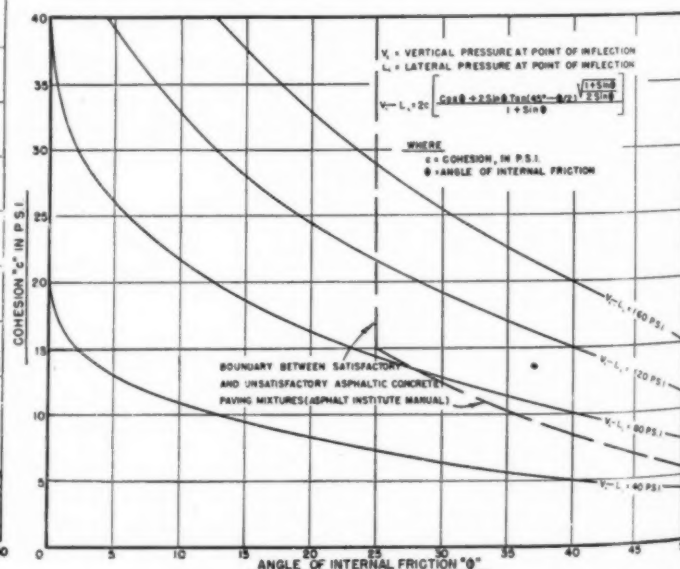


★ Fig. 7. Design chart for asphaltic concrete based upon the triaxial compression test (The Asphalt Institute manual on hot-mix asphaltic concrete paving)



★ Fig. 6B. Relationships between cohesion "c", angle of internal friction "φ", and V-L for triaxial compression test

★ Fig. 8. Graph showing the boundaries between satisfactory and unsatisfactory asphaltic concrete mixtures proposed by the Asphalt Institute, and V-L values





12. It is demonstrated that the term  $V_1-L_1$  is also a measure of the stability of any given material. A series of curves for different values of  $V_1-L_1$ , in terms of  $c$  and  $\phi$ , is illustrated in Fig. 6-B.

13. Fig. 7 is a stability diagram for hot-mix asphaltic concrete paving mixtures, based upon the triaxial test, which appears in the recent manual of the Asphalt Institute. Mr. McLeod points out that this diagram would be more useful if it could be zoned into areas of greater or less stability.

14. So he superimposed Fig. 6-B on Fig. 7, obtaining Fig. 8, and noted that while the  $V_1-L_1$  curve for 80 p.s.i. coincides quite well with the lower boundary for satisfactory mixes in the Asphalt Institute chart, better agreement would be obtained with a curve for a  $V_1-L_1$  value of 70 p.s.i.

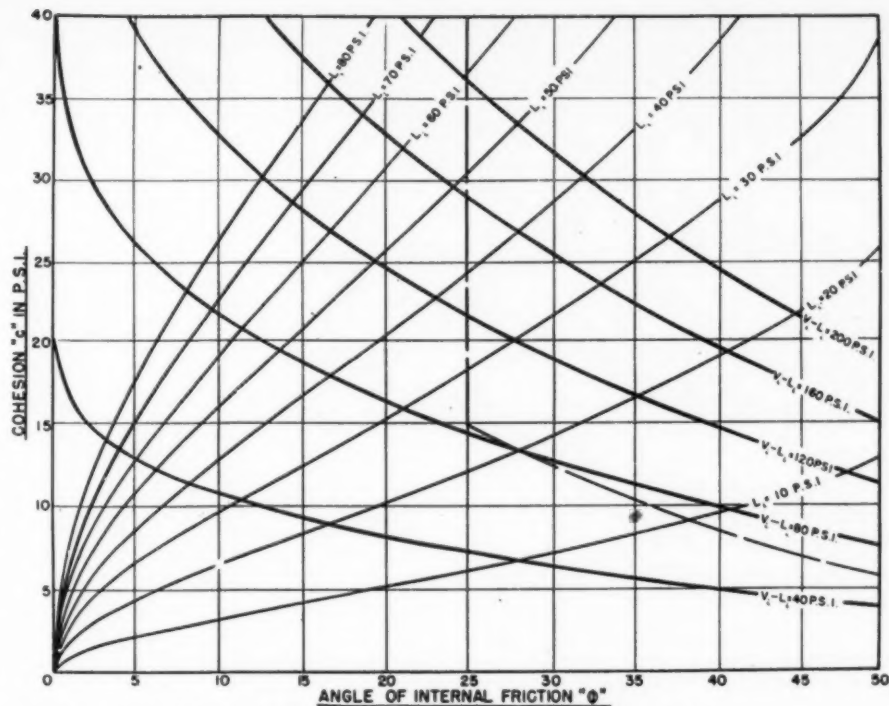
The  $V_1-L_1$  curves of Fig. 8, indicate the direction which corresponding  $c$  and  $\phi$  values for wearing course design should take if greater or less stability were required. For example, if combinations of  $c$  and  $\phi$  values above the  $V_1-L_1$  curve for 80 p.s.i. represent satisfactory bituminous mixture design for ordinary heavy traffic conditions, the greater stability represented by corresponding  $c$  and  $\phi$  values above the  $V_1-L_1$  curve for 120 p.s.i. might be required for bituminous pavements for bus stops and traffic lights where there is much stopping and starting of traffic.

The  $V_1-L_1$  curves of Fig. 8 show the direction in which  $c$  and  $\phi$  values for bituminous mixture design would have to take, if tire pressures much greater than those in current use should be adopted, as is forecast for future aircraft.

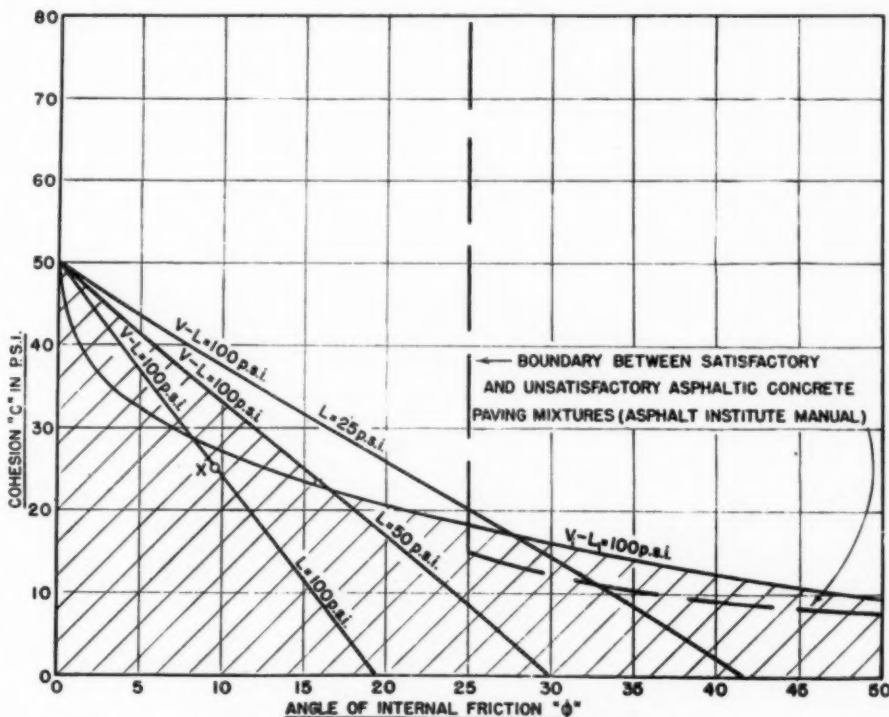
It should be observed that since each  $V_1-L_1$  curve is located above the abscissa, it automatically specifies a minimum value of cohesion  $c$  for the bituminous mixture design to which it applies.

15. There is a limit to the amount of lateral support  $L$  that each bituminous pavement can develop in service. If the applied vertical load  $V$  creates a lateral stress exceeding the maximum lateral support  $L$  available, the pavement will distort or even fail by rutting, rippling, shoving, etc., due to lateral displacement of the surfacing material.

In Fig. 9, the  $L_1$  curves of Fig. 6-A are superimposed on the  $V_1-L_1$  curves of Fig. 6-B. The interpretation of Fig. 9 can be most easily illustrated by an example. Suppose that a series of paving mixtures have corresponding values of  $c$  and  $\phi$  that lie exactly on the curve for  $V_1-L_1 = 120$  p.s.i. Suppose also that the maximum lateral support  $L$  that can be developed on the project



★ Fig. 9. Chart for asphaltic concrete design based upon values of  $c$ ,  $\phi$ ,  $L$ , and  $V-L$  derived from the triaxial compression test



★ Fig. 10. Use of stability curves ( $V-L$ ) and ( $V-L$ ) for flexible surface design

where they are to be used is 40 p.s.i. Fig. 9 indicates that those paving mixtures with corresponding values of  $c$  and  $\phi$  to the left of the intersection of the curve for  $L_1 = 40$  p.s.i. with the curve for  $V_1-L_1 = 120$  p.s.i., would be unstable under these conditions of stress because they could not develop sufficient lateral support for stability. Only those mixtures with  $c$  and  $\phi$  values to the right of this point of intersection would be stable.

16. No experimental data exist concerning the exact amount of lateral support  $L$  that a bituminous pavement can develop in service to resist lateral displacement under load. However, in a bulletin, Highway Research Board Research Report No. 4B, 1948 Supplement, "Airport Runway Evaluation in Canada, Part 2," to be published shortly by the U.S. Highway Research Board, Mr. McLeod has shown that what appears to be a reasonable value

(Continued on page 81)

# JOB and EQUIPMENT IDEAS

## Sod Cutter Makes Good Time on Indiana Job

A mechanical sod cutter that has given good performance is pictured here. It was made in the shop by Frank Phillips, a sodding contractor, 619 So. 15th St., LaFayette, Indiana. We understand that Mr. Phillips holds a patent, and although using the unit primarily for his own contracting work to date, has made up several "carbon copies" and may some day put the machine on the market. Power comes from a 6-hp. Briggs & Stratton motor. The sod cutting blade, working

underneath the machine and on the sides, shuttles back and forth about a thousand times a minute, cutting strips of any desired width. The machine cuts about one acre of sod per day, taking a somewhat thinner and more uniform cut than drag-type machines it is claimed.

The unit is seen here working on a sod job during 1948 for Mollering Construction Co., of Fort Wayne, Ind., the project being Highway 22 between Gas City and Upland, Ind. The job included 50,342 sq. yd. of sodding, which required 1,749 labor-hours, and 106,377 sq. yd. of mulch seeding requiring

1,262 labor-hours. Average sod haul was 5½ miles. The cutter was used again this year on State Highway 52 west of LaFayette, Ind., under contract of Calumet Paving Co., Indianapolis.

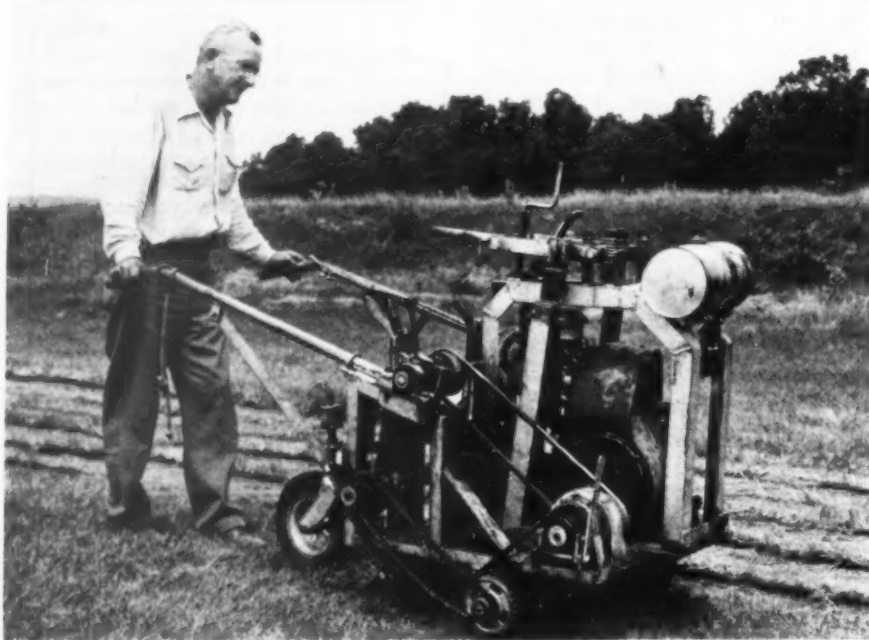
## Another Mulch Seeding Machine

Also sent in by Mr. Phillips of LaFayette are the two accompanying snapshots of his power mulch seeding machine. We've pictured several such machines in R & S [latest: June '49, p. 81, "New Roadside Methods," by W. J. Garmhausen, Ohio Division of Highways.] This unit consists of a three-wheel rubber-tired towed chassis on which is mounted a gasoline engine, blower unit, blow pipe with swivel section for use in aiming in any direction laterally, and a conveyor which feeds straw and other mulch ingredients into the blower. Two or three men can operate this machine, which also is fixed to feed moisture into the mix. You've guessed it. The unit is simply a large-sized Papec silage filler. It includes two blades, pulled back as far as possible or about ½ in. from the cutting bar, and the motor is a 31-hp. Wisconsin motor. The blower outfit is said to be able to cover about ¾ acre per hour.

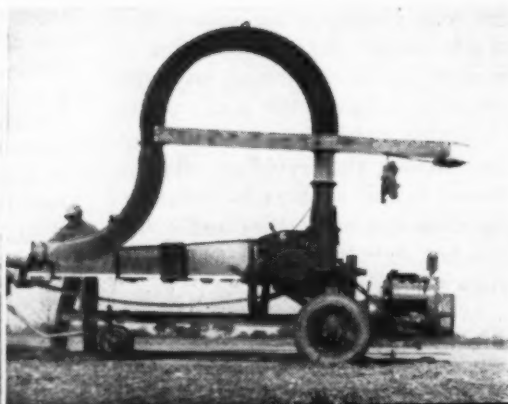
## Keeping Your Rope High and Dry

Wire rope continues to be treated like no dog should be treated around the average field shop. Despite constant reminders by rope manufacturers that rope care pays off in longer rope life, you see reels of it lying in the dirt and stashed around in heaps with little or no weather protection.

It's simple and easy to keep your rope (a) up out of the dirt, and (b) under roof. As a reminder, note the photo taken on MacDougald Construction Company's Atlanta airport grad-



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ing job this past summer. Two saw horses do the trick. They're notched to support two spindles filled with rope reels, only one spindle being used here. Quite a time and labor saver. The horses happened to be in the open in this picture, where getting at rope was more convenient. But the whole business was easily moved under roof in wet weather.

## Metal Ladders Create Safety Problem

*Excerpts from the National Safety Council's Safety Reprint, General No. 7*

Because of the light weight and apparent strength of aluminum and other metal ladders, they are now being used in industry and by the population at large. This use creates new safety problems. Inasmuch as methods of manufacture and use have not yet been standardized, it is important that possible hazards and necessary safety measures be brought to the attention of users of such ladders. No reflection upon the integrity or objectives of the manufacturers of light metal ladders is intended. Such ladders have a definite place in work procedures and in general use. Their safe use is important to all.

**Electrical Hazards**—All metal ladders are electrical conductors. Their use around electrical circuits of any type or in places where they may come in contact with such circuits is not recommended. The electrical hazards of metal ladders need to be given special attention because the ladders which they have supplanted are not conductors. The importance of the electrical hazards involved cannot be overemphasized.

The following are illustrative of the types of structural and other hazards noted:

Channel-shaped side rails may have sharp edges, sharp enough to cut the hand.

Treads, in general, appear to be slippery. Some are smooth, some are punched from the underside, providing sharp projections to prevent slipping; others are corrugated. Unless the corrugations are filled with abrasive material, there appears to be no reduction in slipperiness.

Rubber treads cemented to the aluminum treads are used in some instances, and rubber or other insulating feet are provided to prevent slipping. Sharp edges and burrs were also found on treads.

In some instances, heavy loads cause soft aluminum rivets to bend, so that a shearing action on the rivets themselves results.

## User Recommendations

Prohibit the use of metal ladders in the vicinity of electrical circuits or in places where they may come in contact with them.

Mark all metal ladders with signs or decalcomanias reading "Caution—Do not use around electrical equipment."

Request manufacturers and suppliers to mark ladders properly with respect to electrical hazards.

Remove sharp edges and burrs from side rails and treads.

Select ladders with non-skid treads.

Examine rivets to make sure that soft aluminum rivets have not been used in fabrication.

Provide cemented rubber treads or, on slippery treads, abrasive material in tread corrugations.

Make sure the ladder can carry intended loads without failure.

Wherever possible, press for the standardization of light metal ladders by manufacturers.

Make necessary revisions of safety instructions or codes.

Revise working and job instructions.

Send bulletins on metal ladders to field forces.

Provide publicity in company publications and tell about it in posters.

## Grizzly Stoutly Detailed for Quarry Truck

The accompanying close-up shows the cross-section details of heavy grizzly bars, fashioned by Winston Bros. Co. for a California highway job. The other scene gives a general idea of how these bars are built into a roof-shaped frame for mounting on Euclid rock trucks.

The bars are spaced to reject 6 inch boulders or larger. The bars individually consist of sections of  $\frac{3}{4}$  in. x 6 in. bars on which are mounted 3 x 3 angles of the same thickness. Two trucks so armored were used for shuttling between a large dragline at the gravel pit, and the high-level feeder of a portable aggregate plant.

## Find the Welder in This Picture

He's hidden behind the leaning boards, which have been placed thus to shield other workers from the glare of the welding operation. This safety precaution, which cost nothing by the way, was snapped in the equipment yard of Wunderlich and Company, on the Cherry Creek dam project near Denver.



A THREE-POINT plan designed to provide Maryland with a maximum number of modern highways as quickly and cheaply as possible was outlined recently by the State Roads Commission and its advisory council.

The plan calls for:

1. Modernization of as many roads as possible by easing curves, removing bumps, increasing sight distances, straightening, widening and resurfacing.

2. Rebuilding "trouble spots."

3. Building new highways.

New highways proposed will include a number of limited access expressways with dual-lanes, with 200 ft. right-of-way width minimum.





# New Compactor

## Densifies Old City Dump for Roadway

**Old refuse fill successfully stabilized for Express Highway subgrade using 50 Ton pneumatic tired compactor**

AT Binghamton, N. Y., the Department of Public Works of New York State recently completed a significant experiment in stabilizing a dump fill with a Bros 50-ton pneumatic tired roller with oscillating wheels. The following is digested from a preliminary report of George W. McAlpin, chief soils engineer.

The dump is traversed by an arterial highway system running through the city of Binghamton. It varies in age from 6 months to 15 years. The depth of the fill material varies from 5 to 20 ft., and is composed of the usual dump refuse such as paper, rags, wood, glass, ashes, cans, metal, old tires. The percentage of these materials vary widely in depth and in horizontal directions depending on the time and rate of dumping.

Previously the area was a meandering creek in low flat lands. Accordingly the material underlying the fill consists of unconsolidated organic silt and clay. The area now is a random, irregular fill with wide variations in density and load carrying capacities. A light covering of earth blankets the fill and was placed with no specific effort to obtain compaction.

### Stabilization Problem

One method suggested, excavating unsuitable material and backfilling with acceptable borrow, was ruled out as too expensive because of the large quantities involved, the long hauls to dispose of waste, and the sanitary problem of moving waste through the city.

66

★ The Bros compactor fully weighted to 50 tons, being towed over the dump area

A second suggestion was adopted. It proposed the compaction of the material in place, to give it a uniform bearing value capable of supporting the intended arterial highway fills.

The procedure called for the use of a super-heavy compactor to compact the upper layer of fill and reveal the local weak spots, then to re-enforce the weak spots with sand and gravel and to compact the area to a density that would give a relatively uniform bearing support.

Two compaction tests were conducted on seven test sections. These sections, each 200 ft. long by 20 ft. wide, were laid out in various locations of the dump so that fills of different ages and composition would be included. Progressive elevation profiles were taken to measure the amount of compression or displacement.

The objective of these two tests was to compare the action of the compactor fully loaded on material not previously compacted, to the action on material previously compacted by light rolling; and to record and compare the number and depth of local depressions in the two methods.

On the first five sections the compaction tests were made in three separate stages. In the first stage a Bros Compactor was used empty, weighing 12 tons. Twelve full passes were made. Next the same areas were re-rolled in 12 full passes, with the compactor loaded to 31 tons. In the final stage, with the compactor at its full capacity of 50 tons, the

areas were rolled until no measureable settlement was noticed.

Local weak spots developed during these tests into which the compactor sank as much as 4 ft. These areas were filled and leveled off with a thin layer of gravel before rolling was resumed.

In the second test the compactor was used at its full 50 ton capacity and the last two strips compacted.

### Several Conclusions

It was the general opinion of observers that a more satisfactory construction practice could be developed if the sections were rolled several passes with the compactor loaded to 30 tons, followed by leveling of local depressions with sand and gravel, and then rerolling to completion with the unit loaded to 50 tons.

As the test rolling progressed it became evident that once the local weak spots were leveled with a layer of sand and gravel, and these spots properly compacted, the sections became sufficiently strong to stand additional passes up to 50 tons, without further measureable settlement except for some minor weaving under the pneumatic tires.

The average settlement measured was approximately 1.5 ft. with some maximum depressions up to 4 ft. in localized areas. In general, there appeared to be an increase in the density of the fill to a depth of approximately 4 to 5 ft.

According to Mr. McAlpin the Bros unit performed very satisfactorily with considerable advantages being realized from the oscillating action of the two sets of giant oscillating wheels.

A D-7 Caterpillar tractor was used to pull the unit empty, and an HD-19 Allis Chalmers tractor when one-half and fully loaded. This power was adequate except where the compactor became mired in weak spots where foundation material did not give sufficient traction. In such cases a combination of the two power units worked satisfactorily.

Mr. McAlpin concludes his report with the statement that "the experiment was made to determine the feasibility of such a method of construction and that final decision and design are yet to be made."



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ROADS

# Nation's Untouched Road Work Provides Huge Market for Business

**Backlog of neglected road work will afford stimulus to business and industry, says Senator Joseph C. O'Mahoney, Chairman of the Joint Committee on the Economic Report. Following press release, recently given wide circulation, tells a story of vital interest to road-builders. Along with this news article are tables showing the direct and indirect links between roads and U.S. business conditions**

"AMERICA's backlog of road repair and construction, neglected throughout the country since before the war will afford an unmeasured market for business and industry," Senator Joseph C. O'Mahoney, Chairman of the Joint Committee on the Economic Report, said recently, referring to the responses which he has received from a special inquiry he recently addressed to the Governors and State Highway Commissioners of the 48 states.

"Everyone is aware of the depreciation of the American road system during and following the war," Senator O'Mahoney went on, "but few, I am sure, appreciate the tremendous backlog of essential work which has piled up. I was confident that this depreciation would afford a great new market for business and industry, and, in order to determine its extent, I addressed inquiries last July to the governors and highway authorities of all the states. Forty states have already responded, and of these, the reports received from 34 indicate an accumulation of highway deficiencies which would require an expenditure of more than 20 billion dollars to correct.

"I sought information on the need for road repairs and new construction and also on work currently under contract and for which authorization has been made. These responses I have turned over to the Bureau of Public Roads in order that the information contained in them may be coordinated

*This article, together with the Editorial pages from this issue of "Roads and Streets," is being sent to the governors of the 48 states, and also to congressional committee members concerned with highway matters.—Editors.*

with that which the Bureau itself possesses.

"I knew that United States forest roads and National Park roads had been terribly neglected since before the war. I was aware that tourist traffic in America's playgrounds, the mountains and national parks, is running at peak level, but I also knew that the automobile tourist business, and therefore everything which contributes to the construction and maintenance of good roads and the construction and maintenance of motor equipment, was being retarded by our failure to take up the backlog. The replies which have been received to date tell a more remarkable story than I had imagined.

"Of the 34 states which report present highway deficiencies, Illinois and Ohio, through their state authorities, advise me of the greatest need. Illinois highway authorities say they could reasonably expend 2½ billion dollars on road repair and new construction. Ohio is second with a backlog just under 2½ billion dollars; California needs \$1.4 billion; New York, \$1.3 billion; Georgia, \$1.2 billion; and Massachusetts, \$1 billion. Four New England states, Connecticut, Massachusetts,

New Hampshire, Vermont, and incidentally, New England is the area in which most of the nation's unemployment exists,—tell me that almost two billion dollars could be expended on roads. Connecticut reports \$568 million; New Hampshire, \$218,216,000; and Vermont, \$149,775,000. The estimates for the 34 states reporting are published herewith.

"It would be a mistake to assume that roads are built only for tourist traffic. As a matter of fact, that is a minor aspect of highway transportation. The whole project is a sort of co-operative enterprise in which the Federal government and the governments of the states provide the roadbed while private corporations and individuals furnish the rolling stock and all the incidental equipment and fuel which makes highway traffic possible. Road building is a self-liquidating enterprise, for the owners of the trucks and cars which use the roads pay for the construction through gasoline taxes and motor-vehicle taxes so that road building and road repair produce government revenue and business income, and profit to the individual.

"Work now under contract for the current year in the 34 states which have already reported amounts to slightly less than one billion dollars. 31 states report an additional \$1.2 billion of highway construction as authorized.

"The states have also been asked about the effect of recent changes in the price and material supply situation in relation to the bids they are now receiving. All states report in-

## Latest Conservative Estimate of Highway Construction Needs in 34 States

State	Cost	State	Cost
Alabama	\$ 844,000,000	New Hampshire	\$ 218,216,000
Arizona	44,268,000	New Mexico	156,000,000
California	1,415,000,000	New York	1,333,333,000
Colorado	402,381,000	North Dakota	53,343,500
Connecticut	568,000,000	Ohio	2,480,000,000
Florida	115,704,000	Oklahoma	264,000,000
Georgia	1,227,666,185	Oregon	440,000,000
Idaho	229,750,000	Pennsylvania	960,000,000
Illinois	2,518,916,800	Tennessee	300,000,000
Kansas	863,660,000	Texas	572,000,000
Louisiana	500,000,000	Utah	275,428,000
Maryland	600,000,000	Vermont	149,775,025
Massachusetts	1,000,000,000	Virginia	114,649,765
Michigan	150,000,000	Washington	401,448,000
Montana	838,705,000	West Virginia	600,000,000
Nebraska	464,954,000	Wisconsin	370,000,000
Nevada	83,274,000	Wyoming	28,065,000
		<b>Total</b>	<b>\$20,682,537,276</b>



creased competitive bidding as a result of more contractors being interested in each road project, and there has been some drop in bid prices as the supply of machinery, materials and manpower increases.

"How significant a factor highway construction is in the national economy is indicated by the fact that in 1948 highway transportation expenditures, including outlay for vehicles, repairs, gasoline, tires, and all related services, were estimated to amount to a record 30 billion dollars, or  $\frac{1}{4}$  of the total national income.

"The interest and enthusiasm with which the highway authorities have responded to my inquiry has been marked. The staff of the Joint Economic Committee and the Bureau of Public Roads are preparing a detailed report which I hope will be completed within the next few weeks. When all the information has been compiled and analyzed, a detailed report will be made to all the state authorities who have cooperated in responding to my letter."

## Road System Helps Support Even the Railroads

*Automotive industry and highway transportation dependent on the U.S. highway system generate the following estimated automotive rail freight by commodity groups—1948*

	Carloads*
Motor Vehicles, Parts, Tires	813,546
Gasoline	498,000
Crude Petroleum	174,000
Lubricating Oil	83,000
Iron and Steel	209,000
Iron Ore	269,000
Coal and Coke	98,000
Lumber	15,000
Road and Fuel Oil	63,000
Crude Rubber	33,000
Cement for Roads, Bridges	438,000
Asphalt for Roads	125,000
Gravel, Sand, Stone, Brick	850,000
Miscellaneous, such as non-ferrous metals, paints, upholstery	248,000

Total Automotive Freight Carloads 3,917,000  
Rail Revenues from Automotive Freight \$815,000,000

\*Partly estimated by Automobile Manufacturers Association.

## This Production Wouldn't Exist Without Roads

*Automotive Industry Consumption of Products of Other Industries—1948*

Items	Estimated Consumption
Steel	10,220,982 net tons
Iron, malleable	422,563 tons
Gray iron	1,400,545 tons
Rubber, crude	699,741 long tons
Plate glass	173,937,900 square feet
Leather, upholstery	40,006,086 square feet
Aluminum	31,027 tons
Copper	162,524 tons
Tin	14,775 tons
Lead	336,868 tons
Zinc	112,289 tons
Nickel	14,775 tons
Cotton	1,084,697 bales
Lumber, hardwood	258,561,329 board feet
Lumber, softwood	153,659,304 board feet
Glycerine	26,890,378 pounds
Cloth, upholstery	66,664,498 yards
Manganese ore	57,622 long tons

## Whole Nation Depends on Truck Movement

*Motor Trucks Haul High Percent of Farm Products and Other Commodities*

Commodity	Percent Hauled by Truck	Commodity	Percent Hauled by Truck
Livestock (66 Markets)		Fruit and Vegetables (12 Markets)	
Cattle	69%	Apples	58%
Hogs	74	Beans	78
Calves	73	Cabbage	64
Sheep and Lambs	42	Cantaloupe	32
Total livestock	69	Cauliflower	63
Dairy Products		Celery	51
Milk (75 Metropolitan areas)	100	Cucumbers	79
Butter (10 Markets)	44	Grapefruit	28
Fresh eggs (11 Markets)	65	Green Corn	86
Cheese (10 Markets)	20	Greens	90
Live poultry (10 Markets)	98	Lettuce	40
Dressed poultry (11 Markets)	56	Onions (dry)	36
Miscellaneous		Oranges	25
Sand and gravel	66	Peas	40
Crushed stone	48	Peaches	65
Portland cement	16	Potatoes	38
Fuel briquettes	18	Squash	93
Packaged fuel	93	Strawberries	83
Blast furnace slag	46	Sweet potatoes	75
Pulpwood	90	Tomatoes	51
Household goods	90	Watermelon	46

Sources: U. S. Department of Agriculture, U. S. Bureau of Mines, American Trucking Associations.

## Vacation Business Has \$9 Billion Stake in Road Conditions

*Estimated vacation travel income of states in 1948. (Based on studies by state government agencies, tourist bureaus, AAA motor clubs, federal reserve banks and other sources.)*

Alabama	\$ 50,000,000	Nebraska	\$ 60,000,000
Arizona	100,000,000	Nevada	60,000,000
Arkansas	125,000,000	New Hampshire	108,000,000
California	700,000,000	New Jersey	375,000,000
Colorado	125,000,000	New Mexico	80,000,000
Connecticut	51,000,000	New York	1,000,000,000
Delaware	50,000,000	North Carolina	200,000,000
Florida	700,000,000	North Dakota	30,000,000
Georgia	105,000,000	Ohio	500,000,000
Idaho	50,000,000	Oklahoma	60,000,000
Illinois	350,000,000	Oregon	92,000,000
Indiana	325,000,000	Pennsylvania	600,000,000
Iowa	185,000,000	Rhode Island	19,000,000
Kansas	250,000,000	South Carolina	50,000,000
Kentucky	71,000,000	South Dakota	60,000,000
Louisiana	100,000,000	Tennessee	150,000,000
Maine	115,000,000	Texas	350,000,000
Maryland	50,000,000	Utah	100,000,000
Massachusetts	192,000,000	Vermont	53,000,000
Michigan	500,000,000	Virginia	150,000,000
Minnesota	200,000,000	Washington	150,000,000
Mississippi	200,000,000	West Virginia	100,000,000
Missouri	200,000,000	Wisconsin	300,000,000
Montana	61,000,000	Wyoming	50,000,000
		Total	\$9,552,000,000

Note: There now are an estimated 30,000 motels along main highways of the nation, compared to 20,000 in 1941. Some 14,000 resort hotels and cabin establishments depend on motor vacationists.

An estimated 3,917,000 carloads of freight carried by the railroads in 1948 consisted of material for the automotive industry. The railroad revenue from the automotive freight was estimated at \$815,000,000.

American motor cars consumed 30,460,641,000 gallons of gasoline in 1948. This was 88.7% of total usage.

Motor vehicles use half the malleable iron produced in the United States, 75% of all plate glass, 80% of the crude rubber, 89% of the gasoline, 68% of all upholstery leather, 37% of the mohair, 23% of the nickel.

When 5 million motor vehicles are produced in a year, they use up agricultural products grown on 2½ million acres, to make paints, lubricants, seat coverings and other preparations. They take 345 million pounds of cot-

ton, 2½ million bushels of corn, 12 million gallons of molasses, 160 million pounds of wool, 10 million pounds of turpentine and sizable amounts of beeswax, flaxseed, paper and lumber.

Raw materials for making motor vehicles come from all 48 states.

The business of making, selling, servicing and driving motor vehicles employed nearly 9 million men and women in 1948—more than one in every seven persons earning a living in the nation.

The average age of cars in use in 1948 was 8.8 years; trucks, 7.8 years. The average age of vehicles scrapped is 12.25. 25.6% of all cars on the road in 1948 were 12-13 years old or over. 60.2% of these cars on the road were 8 to 9 years old or over.



# City Officials

## Hold Annual Public Works Congress

**Delegates to Kansas City meeting take up long-range planning problems, and hold outstanding group sessions on financing, motor equipment, refuse collection, street maintenance, snow removal, surveys and planning, disaster relief, street construction, and personnel problems**

**H**OW to meet public demands for constantly more and better trafficways, sewers, water facilities, airports and other municipal works was the 64 dollar question at Kansas City, Mo., recently, where nearly a thousand delegates and visitors attended the 55th annual Public Works Congress.

It's no news, of course, that city governments are beset with pressing budgetary problems, but the speakers at the Congress served to bring the hugeness of the public works backlog into sharper focus. This was done from several standpoints. The possibility of public works programs as an employment safeguard in event of future recessions was told by James W. Follin, deputy administrator, General Service Administration, which agency now has the U.S. Bureau of Community Facilities. Adequate advance planning of public works as a selfish means of cutting costs and getting the most for the city's money, was advocated by Robinson Newcomb, member of the President's council of economic advisors. Desirability as a means of underwriting future industrial, residential and commercial growth was analyzed by T. Ledyard Blakeman, Detroit regional plan commission.

And among many others in a round-table discussion on municipal planning, Rollin F. Agard, finance director, Kansas City, Mo., put in an important word, warning of a possible recurrence of the fiscal evils of the '20s attending mushroom city growth. Agard urged more intelligent planning to provide the means of relieving traffic congestion and housing shortages, and to provide better parks, schools, street lighting, sanitation, water and other facilities. A city's revenue program should be analyzed to determine the reasonable margin of funds that may be available for such betterments, over and above normal operating expenditures. An increasing trend toward pay-as-you-go financing of long-term municipal programs was noted by this speaker.

A "more equitable" division of

state-collected highway user funds, for use in constructing and maintaining urban streets, highways and expressways was asked in a formal Association resolution.

Notes on a random selection of papers and discussion periods are given in the following.

### Motor Equipment Performance

A morning devoted to motor equipment brought out many interesting points. A paper by C. M. Nelson, editor, *Better Roads*, reviewed the excellent advance in mechanization of rural highway maintenance, and challenged cities to make fuller use of latest modern equipment. Various speakers repeatedly stressed the need for setting up better systems of keeping performance and cost records for mechanical work. "Analytical aids in selecting equipment", was the phrase used, since only by keeping track of the results of using certain kinds of machines can the street department official determine which type is best for his needs. Such data come in handy also in selling hard-headed councilmen on approving equipment purchases.

Among the delegates to discuss this subject informally was Maurice M. King, director of public works, Santa Monica, Calif., who reported that his staff keeps a card system. This system furnishes a running log on main-

tenance costs and equipment operating costs. The problem, as agreed on in discussion, seems to be that of determining unit or job costs on specific tasks by hand methods vs. mechanical (such as with power loaders), and also of comparing outdated equipment with improved models and types now on the market.

### Equipment Maintenance Ideas

A few tidbits from the motor equipment discussion:

1. Grease your trucks every 750 miles but make your crankcase oil last considerably longer than the familiar 1,000 miles—4,000 miles perhaps, suggested Col. P. D. Berrigan, of the Corps of Engineers, whose Kansas City staff maintains much heavy equipment.

2. Equipment operators charged with reporting repair needs on their machines, often tend to want worn parts replaced sooner than is best for maximum economy. Judgement is needed here.

3. Watch the repair shop load. If your shop is overloaded and can't keep up with the preventive maintenance schedule, it may pay to farm out the heavy repairs to an outside shop. Preventive maintenance routines should be protected first, and constant check-ups are needed, from the top "brass" down to the last driver and operator, in order to be sure of thorough preventive upkeep.

How are your lube men going at it? There may be a tendency to force too much grease into the fittings, due to the high pressure utilized by the lubrication equipment. This will result in forcing excess grease out of the seals, opening them up so that dust and dirt



★ President-elect Jones (right) being congratulated by retiring President Xanten

## APWA Officers and Directors for 1950

**President:** W. O. Jones, city manager, Fort Worth, Texas; succeeding Wm. A. Xanten, Washington, D.C.

**Vice-Presidents:** William S. Foster, engineering editor, American City (re-el.); Carl Froerer, city manager, Alameda, Calif. (both for 1950-51 terms); continuing in office for 1949-50, W. A. Gayle, city commissioner, Montgomery, Ala.; Robert L. Anderson, supt. of public works and village engineer, Winnetka, Ill.

**Treasurer:** Allan H. Rogers, supt. of public works, Garden City, N.Y., succeeding Glenn C. Richards, Detroit.

**Directors:** (Elected) George R. Thompson, city engineer, Detroit; E. J. Cleary, executive director and chief engineer, Ohio River Valley Sanitation Commission, Cincinnati, O.; (continuing): Milton Rosen, commissioner of public works, St. Paul, Minn.

enter the bearings. "Shoot until you see the grease start to squirt out, then stop." Grease cups, on the other hand, are often neglected—not turned or filled often enough.

### New Equipment Developments

Among the new mechanical units talked over by the municipal men were front-end loaders, spreaders, many-purpose grader-scraper-dozer units, curb-gutter forming units, vibratory tampers for street patching, mechanical brush pulverizers, leaf loaders, and pavement joint cleaners.

One speaker, for example, told of finding wider and wider uses for his Scoomobile, now used for consolidating wet leaves, handling yard materials, handling rubbish (even baled paper and compressed tin cans), mounting and repairing traffic lights (with boom ladders), handling snow and ice with special ice bucket, etc.

Leaf loading was one of the most discussed maintenance tasks. Meeting chairman F. M. Galloway of Montclair, N.J., spoke of using a Snogo for leaf collection, at an annual saving of \$10,000 or 50% of his former cost. Allen H. Rogers, supt. of p.w., Garden City, New York, has successfully used leaf collectors and brush cutters to convert collected material into valuable compost heaps of wood chips, grass and leaves, thus largely eliminating the hauling and disposal problem.

Various types of brush cutters and

leaf collectors were criticized as being too slow. Apparently there is a big need for more experience reports on such units, which possibly may be sources of economy even though not perfect machines.

Another city used a suction leaf collector in reverse as a DDT spray.

Glenn Richards, superintendent of public works, Detroit, spoke of the pioneering his city has done in development of mechanical units that will save time and labor, and congratulated the American Public Works Association for its closer alliance with equipment manufacturers in the development of better equipment. He feels that we have just scratched the surface of the job of perfecting both specialized and many-use machines for the municipal field.

Richards has been a leader in cooperating with the makers of new equipment. He plans a demonstration of a suction-type unit as a possible means of cleaning streets, instead of "white wings" with hand carts and flusher units. Latest example of city-factory cooperation was the recent demonstration in several cities of a new air or gunite-type system of concrete placement for building up disintegrated curb areas. The new Mall 11-lb. chain saw, perfected for use up on ladders in tree limb cutting, was given a good word. Systematic tree pruning saves money when storms hit, in eliminating most of the clean-up costs that usually follow heavy wind storms, it was said.

### Asphalt Heater-Planers

The use of heater-planers for asphalt street repairs was discussed. Oakland, California, has planed over 100,000 sq. yd. of asphalt pavement annually; no resealing except after every third planing. Cincinnati has made good use of the latest heater-planers, following long use of older heaters in conjunction with street repairs. A .10 gal. seal is considered necessary on stone-filled mixes, but none on sheet asphalt. In Omaha the value of sealing in conjunction with the heater was demonstrated last winter, according to the city engineer, who said that failure to reseal resulted in considerable frost damage.

Another city reported use of scrapings from burner jobs to build a road to the city dump. The material still had good "life" in it.

### Street Construction Notes

The street construction and layout session was marked by three valuable papers, by James H. McKay, highway engineer, Baltimore; Reed McKinley, director of public works, Kansas City, Mo.; and George H. Sandenburgh, city engineer, Ann Arbor, Mich.

Mr. McKay told of his city's exten-

sive (\$10,000,000) postwar street resurfacing program. Before undertaking the long overdue job, the city sent engineers to other cities to gain ideas on such matters as asphalt mix design. Over 5,000,000 sq. yd. of resurface and 2,000,000 sq. yd. of surface treatment have been completed in the past two years, much of it utilizing an economy mix making the most of local fine materials.

### Kansas City's Program

Kansas City's program of resurfacing, while extensive since the war, has been confined largely to the arterial streets, as the best investment for the greatest good. The job is considered to have three divisions—immediate repairs of breaks; preventive maintenance; and major rehabilitation of old streets. Typical of many American municipalities, Kansas City has a preponderance of streets now very old, built 30 to 60 years ago.

Foremen in the nine street maintenance districts have the daily duty of reporting pavement repair needs, which are taken care of by repair crews sent out to the district. City building inspectors and other municipal personnel also aid in reporting street conditions needing attention, and reports are repeated if the repair crew isn't prompt.

Along with many other cities, Kansas City's practice is for the utility company to make pavement openings, under a permit, but for city forces to backfill to insure proper consolidation and avoid pavement depressions afterward. The city charges \$6 a sq. yd. for pavement removed, computing the cost on a basis of 6 in. added on each side (a 3x3 ft. area for a 2x2 ft. cut). Backfilling charge is \$3 per sq. yd. For unimproved streets the charge is only \$2 per sq. yd.

Winter patching is done unhesitatingly for the purpose of keeping surfaces in safe condition, often being made immediately following snow plowing. Rebuilding of patches later with more durable construction is expected, and the cost charged to good service.

Mr. Sandenburgh of Ann Arbor, Mich., outlined the details of a workable cost keeping system for the city public works department.

### Street Design Developments

The factors entering into the proper design of an urban trafficway were presented by C. N. Conner, principal highway engineer, Bureau of Public Roads, Washington, D.C. He discussed such essential elements as design speed, profile and grade, design traffic data, intersections, widening needs and possibilities, pavement width, use

(Continued on page 82)



**PROJECT:** Three-span-continuous I-beam bridge over Panther Creek, U.S. 24 West of Pontiac, Illinois. Completed late in 1948.

**Contractor:** Mass Construction Co., Algonquin, Illinois.

**Construction Notes:** Excavation for footings was performed by a Manitowoc Speedcrane with 66-ft. boom, this machine also handling forms and sheeting and later setting concrete with a drop bucket and placing deck steel.

Concrete plant, located first at one end of the bridge then the other, con-



## Simple Concrete Methods for Small Bridges

sisted of a CMC 3-sack mixer, supplied directly into the skip from a mobile pneumatic-tired batch plant. This plant, also manufactured by Construction Machinery Co. (CMC), included a 2-compartment bin which fed aggregates into a hopper shuttling along a rail between spouts and skip. In operation the mixer operator watched over his end of the business, while the batcher operator loaded the traveling hopper first at the sand, then at the gravel spout, shunting it then to the skip where the aggregates were deposited along with cement from sacks. Neat and simple. A Scoopmobile loaded the bins from stockpiles. The concrete bucket was a 1-yd. Heltzel bottom-dump. Darex was used for air entrainment. Mix water was pumped from the stream.

Concreting operations ran into cold weather late in the season, and precautions taken at the time these photos were snapped (November) included use of a kerosene burner at the mixer throat, supplied from a pressure tank kept up by means of a small air-cooled-motor-powered compressor.

Concrete riprap 6 in. thick was placed along the fill slopes, extending under the end spans and around the radius of the slopes of either side.

This concrete, which was wire mesh reinforced, was deposited with the crane and bucket, struck off with a heavy bull float, and covered with bur-lap and straw for combined curing and

frost protection.

**In Charge:** Joe Smith, resident engineer, working out of the Peoria district, Illinois division of highways.



★ Better view of the traveling hopper, which worked out fine here. Operator about to dump batched aggregates into skip

★ Note kerosene burner and pressure tank (arrows) for heating mixer contents as prescribed on frosty November mornings

★ Placing concrete for bank protection mat, the Manitowoc crane operator merely swiveling around and spotting bucket with rope and tagline

71





## Michigan Initiates First Federal-Aid

# Re-Signing Program

**\$1,500,000 program marks first instance of use of Federal funds for a systematic sign improvement project in a state**

**By J. Carl McMonagle**

Director, Planning and Traffic Division,  
Michigan State Highway Department,  
Lansing

**T**HE Michigan State Highway Department launched a very extensive and important re-signing program in August of this year when it took bids for the panels and fixtures required for the first phase of the project. It marks the beginning of an undertaking which has real significance, not only for the users of the Michigan

state highway system, but for highway administrative agencies in general.

In some respects this program is unique. In the first place it is statewide in its scope, involving the eventual rehabilitation of all signs on all of the 9,400 miles of rural and urban trunklines in the state system. In the second place, the initial phase of this \$1,500,000 program has been set up as a Federal-aid project; it marks the first time that Federal highway funds

have been channeled into this field of highway operation.

The story of the inception and preparation of the program is an indication of the Michigan State highway department's policy of utilizing all available means for meeting the needs of its traffic.

### Serious Sign Obsolescence

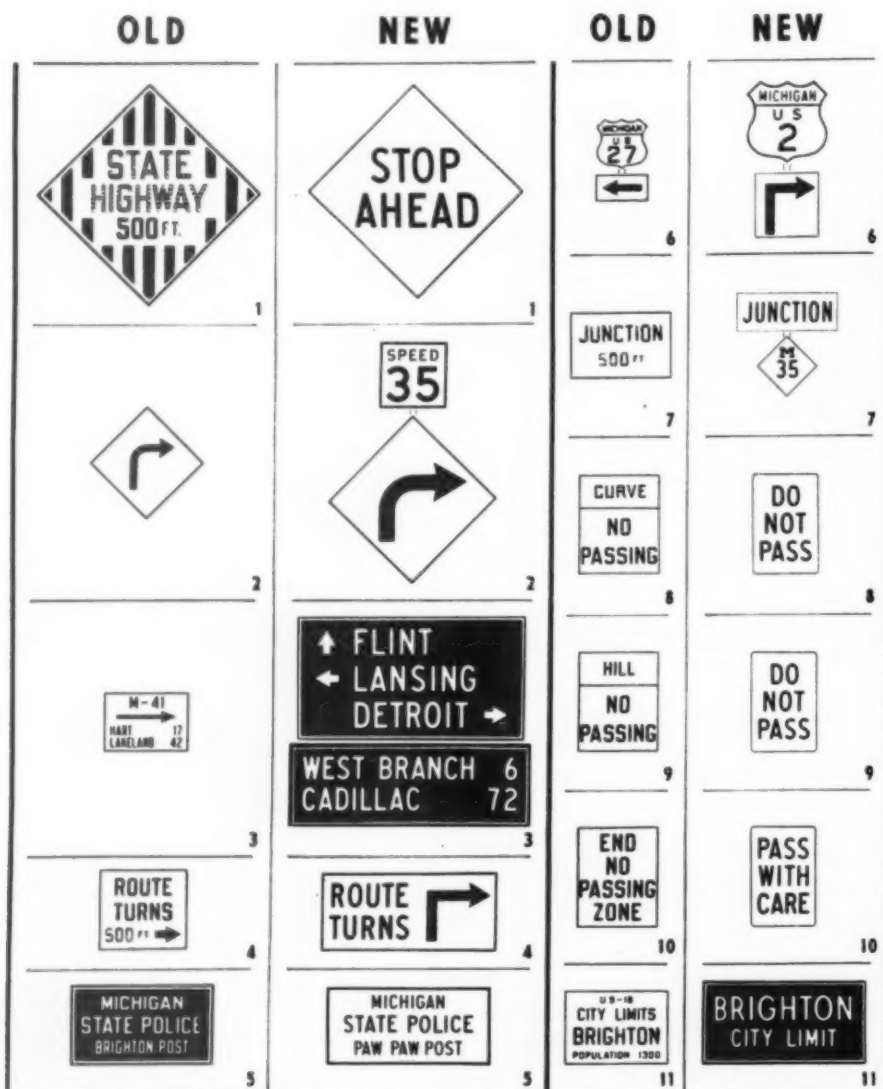
This comprehensive project was made necessary by the hiatus in most kinds of highway construction during World War II and by the changes in signing practice which were validated by the 1948 Manual of Uniform Traffic Control Devices. The adequacy of Michigan's prewar sign installation was high according to the then current standards. However, physical deterioration of the old equipment was rapid during the war years, and the increased volumes and knowledge of traffic in the immediate postwar period called attention to the fact that much of this equipment had become obsolete.

Studies of the sign situation were started soon after VJ Day. These substantiated the very apparent fact that impairment was serious and widespread. The Department's maintenance of existing signs was accelerated, and some 17,000 new signs were installed on the rural highways. In so far as possible, old signs were brought up to approved standards.

It was evident from the start, however, that a thorough rehabilitation of the system's sign equipment was needed, and that this could not be accomplished within any reasonable time with State funds alone. It was decided, therefore, to draw up the outline of an inclusive statewide program and to ask for Federal participation under provisions of the Federal-aid Highway Act of 1944.

This proposal was submitted to the Public Roads Administration which approved to the extent of authorizing a survey of conditions and an estimate of needed work. These preparatory steps were taken and in July, 1948, formal application was made for "authority to construct highway signs on Federal-Aid primary routes." Authorization for sign construction on the 2,347 miles of rural trunkline covered by this application was given on July 6 of the present year.

The current project provides for the complete re-signing of the thirteen



★ Some of the changes in sign details planned in the Michigan program

principal trunkline routes on the state system. These routes are US-2, US-10, US-12, US-16, US-24, US-25, US-27, US-31, US-112, US-127, US-131, M-21, and M-78; they include the heaviest traveled rural highways in the state of Michigan. The whole program, as now planned, contemplates that the present project will be completed in the spring of 1950, that re-signing of the remaining 5,950 miles of rural trunkline will be undertaken later that year, and that the approximately 1,100 miles of urban trunkline routes will be similarly improved in 1951.

Since the project already authorized sets the pattern for the completion of the Michigan sign program and probably for work under applications which other states may make in the future, its terms have special interest.

There really are three parts to the initial Michigan signing project, all of them covered and provided for in the application and authorization. The first part is the purchase of the nearly 21,000 new signs which are required for the resigning of the thirteen major routes involved. This material is to be bought under contracts let on the basis of competitive bids. There will be Federal participation in this cost on the familiar 50-50 basis.

The second part is the erection of these signs. This is to be done on a force account basis by specially organized crews of Department personnel using Department-owned equipment. The costs of this installation work, except rental charges for equipment, also will be met equally by State and Federal funds.

The third part is the rehabilitation of existing signs which are standard in design and which can be improved to the equivalent of new signs by refinishing or other repair operations. It is estimated that these signs will account for approximately 10% of the completed installations. The costs will be handled as a maintenance charge of the Department with no Federal participation.

### Follow Uniform Standards

Plainly, with the completion of the program, the Michigan state system will be equipped with highway signs, every one of which will be bright and fresh in appearance and will represent the latest developments in traffic sign design. However, although the signs generally conform to the standards set by the national "Manual of Uniform Traffic Devices," in a few instances designs have been modified to meet Michigan conditions, or practices.

In most cases the divergencies from Manual standards adopted by Michigan traffic engineers and permitted by the Bureau of Public Roads, repre-

sent attempts to compensate for the higher speeds of present-day traffic. The objective is to make the signs more easily readable at greater distances. To do this, the over-all dimensions of several signs have been considerably expanded, while on other signs the message has been simplified and made more direct. These variant types are included among the signs shown on the accompanying plate.

One of the signs which has been enlarged for increased service to speeding traffic is the curve warning (No. 2 in the Plate). When used alone, its curving arrow symbol gives the driver notice of curves where he should use ordinary care. In cases where the curve is sharp or lacks desirable super-elevation, the practical speed for that curve is suggested by an added square speed panel just above the diamond-shaped curve sign. The curve sign is to be equipped with over-size plastic reflector buttons delineating the curve symbol. Both panels have a yellow reflectorized background with the letters and symbols in black.

### Intersection Guidance

Another sort of change was made to provide improved guidance to traffic at intersections. The old direction and distance sign (No. 3) has proved to be too small and to carry too much information to be read at a glance. So its functions were divided between two new and larger signs. The first, placed just in advance of a trunkline junction, points the directions to two or more named cities. The second, placed on each route beyond the intersection, tells the distance to the next urban place and to the most important city on that route. The latter sign thus serves the double purpose of giving distance information and of confirming the motorist in the correctness of his direction of travel.

Changes made in the highly important signs marking no-passing zones, resulted in a reduction in the number of sign designs. Standard practice specifies three different panels (Nos. 7, 8, and 9) for this purpose. As will be seen, they provide that the beginning sign shall give notice whether it is a hill or a curve which is the reason for the no-passing restriction.

It is quite apparent, however, that a driver can recognize these natural features more easily than he can read a long message. So Michigan has designed a single new sign, and its simple message, "DO NOT PASS" in large letters, is immediately legible and understandable. Likewise the standard sign marking the "End of No-Passing Zone," is replaced by one bearing the injunction, "PASS WITH CARE." It is believed that these mes-

sages addressed directly to drivers will result in better compliance.

Certain changes also have been made in the installation specifications for all roadside signs in this program. They provide that the bottom of each panel shall be 7 ft. above the pavement surface level to assure good vision over intervening vehicles. Moreover, these signs are to be set at least 10 ft. from the pavement edge to leave ample room for maintenance operations and for emergency stops.

These Michigan revisions have been made after careful study and long experiment. In all cases the revised versions are developments from designs that had become standard and therefore retain the familiarity of appearance which adds to their effectiveness. Yet the Department's traffic engineers are certain that these minor changes will result in quicker and clearer communication of guidance or warning. The acquiescence of the Bureau of Public Roads engineers indicates that they may share this opinion.

It is expected that delivery of material under the initial contracts will start early in the fall. This will permit the Department to begin installation operations this year and will assure completion of the work next spring. The estimated cost of the part of the project in which there will be Federal participation is \$246,000.

The Michigan State Highway Department has always taken an active interest in its traffic engineering responsibilities. Its policy in seeking and finding a solution to the problem of modernizing its sign plant, shows that it is determined not to fall behind in this field.

### Clearing House Section Outstanding Used Equipment Values

Over one hundred fifty individual advertisers feature an exceptionally large selection of used equipment in the 10-page "Clearing House" section which starts in this issue on page 100. Readers will find the "Clearing House" a dependable and informative directory of outstanding values in used equipment and we suggest that you make perusal of these pages a regular habit each month. At any time that you have equipment you wish to sell, anywhere in the country, we suggest that you present your offerings in our "Clearing House." This section is growing faster, getting larger every month because it's doing a better, quicker selling job—at one low cost!





★AGC executive committee: Dwight W. Winkelman, Syracuse, N.Y.; John C. Hayes, attorney of Washington, D.C.; Forrest W. Parrott, Sioux City, Iowa; Mrs. Charley McCarthy, AGC Staff, Washington, D.C.; Vice President Walter L. Couse, Detroit, Mich.; President Adolph Tiechert, Jr., Sacramento, Calif.; Managing Director H. E.

Foreman, Washington, D.C.; J. B. Swem (in corner), AGC staff; C. S. Embrey, AGC staff; P. D. Christian, Atlanta, Ga.; C. P. Street, Charlotte, N.C.; Chas. L. Harney, San Francisco, Calif.; John MacLeod, Paramount, Calif.

# General Contractor Group

## Considers the Construction Outlook

**AGC members at midyear board meeting discuss ways of expediting the roadbuilding program; review price trends and industry problems**

**H**OW contractor groups can help "sell" the public and the lawmakers on the greater volume of highway work which road conditions demand in all states in coming years, was one of numerous topics taken up at French Lick Springs by the Associated General Contractors of America, Inc.

Their midyear meeting of the AGC's governing and advisory boards held Sept. 12-14, as customary was marked by a report on business by managing director Harold E. Foreman, and by round table discussions by the Highway and Airport, Heavy and Railroad, and Building Construction groups.

President Adolph Tiechert, Jr., of Sacramento, in his address noted with

pride the growing stature of AGC, whose membership of 5,300 in 107 chapter groups includes firms performing 80% of the nation's construction volume. This year's gain of 300 members marks the continuation of a long uninterrupted growth. AGC now ranks as one of the top business associations dedicated to progressive, enlightened policies for the good of an industry.

Among the highlights of the meeting are the following:

Construction costs are stabilizing or declining slightly on a national scale. Present costs average about 10% below the war peak.

Highway costs have dropped appreciably since Jan. 1; the Public Roads

Cost Index fell 6% during the first half, structural work dropping 9.4%, surfacing 6.1% and excavation 2.4%.

Contractors report adequate supplies of materials, machinery and manpower, and a notable increase in worker productivity and management efficiency.

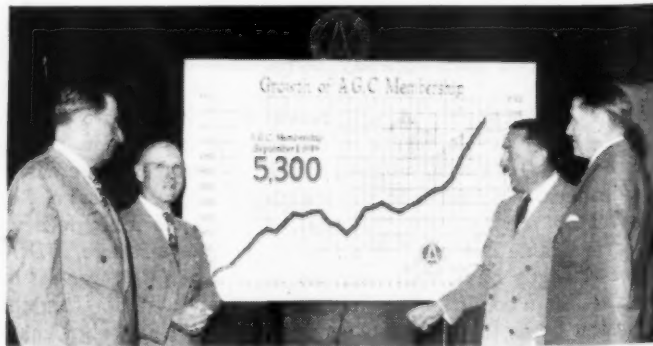
Competition for contract jobs has been keen. An analysis of federal-aid road awards during the first seven months shows an average of 6.1 bids per job, as against 4.2 in 1948, 3.8 in 1947 and 3.9 in 1946.

### Ample Contractor Capacity

Ample capacity for more activity in all categories of construction—highway, building, heavy and railroad—was reported, with about half the replies reporting more work coming on the market in the middle of the 1949 construction season. The great majority of replies recommended this as



★ AGC Highway Division leaders: George C. Koss, Koss Construction Co., Des Moines, Iowa; N. K. Dickerson, Jr., Dickerson, Inc., Monroes, N.C., vice-chairman; A. N. Carter, manager, Highway Division. (At right), AGC leaders examining membership curve







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(Note the full Buckets)

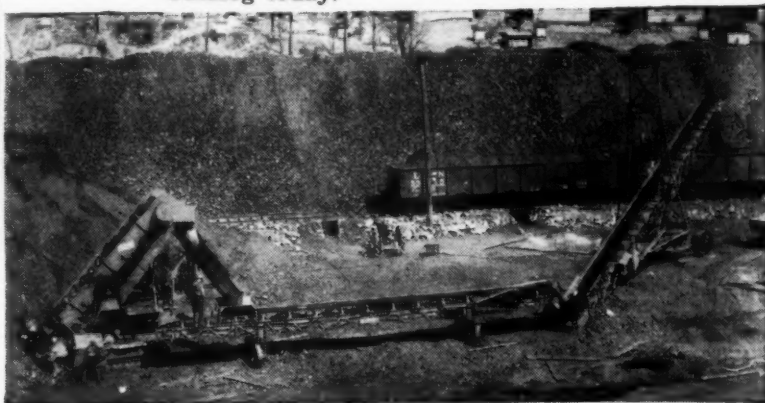
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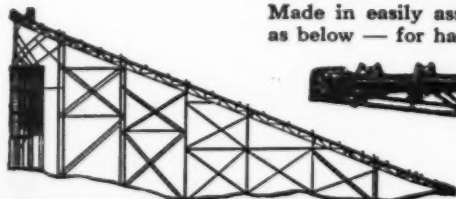


### HAISS CAR UNLOADERS (Models 483 and 484)

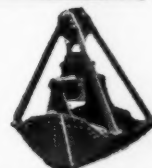
Belt and drag types for low-cost undercar unloading from hopper bottom cars. Ask for bulletin No. 483-4.

### HAISS SECTIONAL CONVEYORS

Made in easily assembled sections. Portable as above or stationary as below — for handling all bulk materials — Ask for Bulletin 487.



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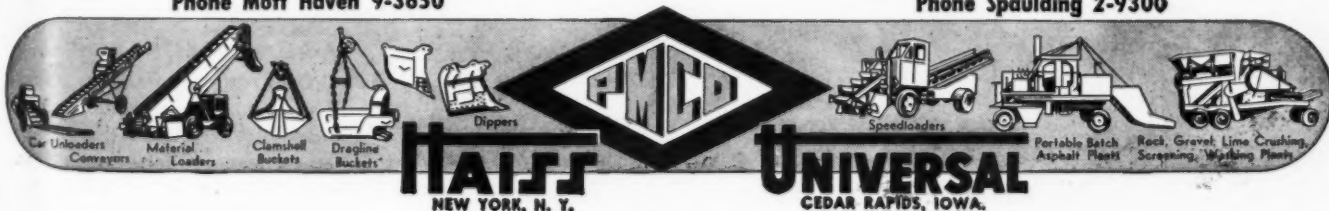
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Experienced Haiss representatives are located in all principal cities. For further information, write, phone or wire.

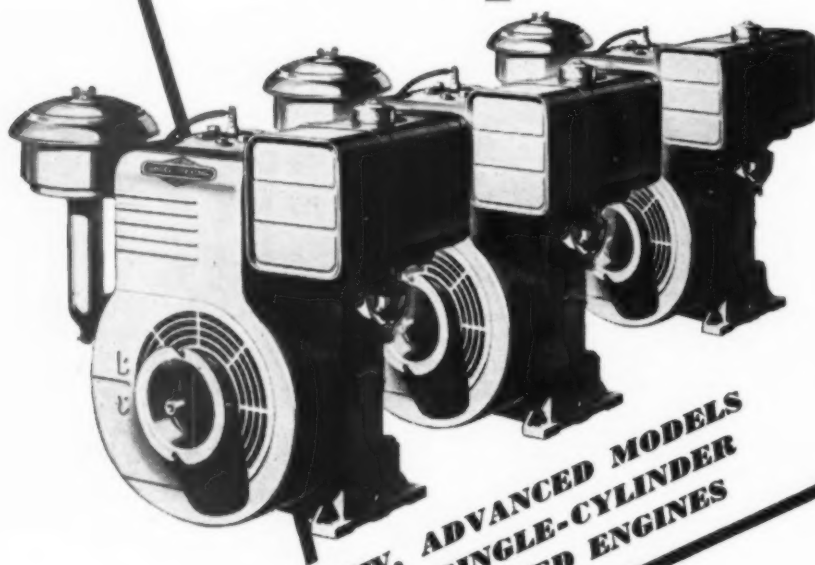
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These new engines set new standards of value, dependability and performance as "preferred power" for machines, tools and equipment used in industry, and construction, by railroads and on farms.

Complete technical information is available on these new Briggs & Stratton single-cylinder 4-cycle air-cooled gasoline engines:

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MODEL "14" 5.1 H. P.

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## AGC Nominees for 1950

**President:** Walter L. Couse, pres., Walter L. Couse Co. of Detroit, Mich., to succeed Adolph Teichert, Jr., Sacramento, Calif.

**Vice President:** is Glenn W. Maxon, pres., Maxon Construction Co., Inc., Dayton, Ohio.

the time when full value would be received for a dollar invested in construction. Strenuous competition and substantially improved labor productivity and management efficiency were cited as major factors in this connection.

Contractors were cutting down on office overhead, reducing the size of key personnel held over between jobs, decreasing price of equipment rental, eliminating overtime, and operating on narrow margins in getting their houses in order for a period of close competition—a period which all reported had already arrived.

President Tiechert contracted the high degree of flexibility with which the contractors and the construction industry has snapped back into normal peace time endeavor after World War II as compared with the 1917-1920 period. First to gear to war, it also was the first major industry to be able to launch its full capacity into production of essential deferred public and private needs in the fields of home building, buildings, utilities and transportation. This nation-wide integration of effort is credited largely to group-action made possible by such organizations as AGC and their inter-industry joint committees.

## North Carolina Problem

Much time was devoted in the Highway group session to the persistence of certain state highway departments in competing with private enterprise. North Carolina's recent purchase of \$5,000,000 in new equipment with which to compete against contractor organizations needing work, was seen to be a blow to the American way of life. Full details of the North Carolina situation are to be circulated among all age highway chapters. A nationwide survey of governmental day labor practices is being made, and legislation will be sought in individual states to restrict such work in the public interest.

## AGC to Aid "Selling"

The AGC groups can be expected to take a more and more aggressive hand in helping highway departments and other state leaders sell larger road programs. The volume of highway con-



struction is seen to be extremely low compared with the huge need on America's out-dated highway system.

Possibility of greatly expanding the civil airport program was covered. A billion dollar federal-aid airport construction program was contemplated. Joint Cooperative Committee of AGC and the National Association of State Aviation Officials has accomplished much work, such as red tape elimination, toward launching of this large program. Matching money in the states and cities is the chief problem. Rapid progress has been made in certain states, and the legal set-up responsible will be passed along to others.

### Specification Progress

Based upon the extensive criticism and comment submitted by AGC, the AASHO subcommittee working on the standard general provisions for highway construction contracts has prepared a new draft of the general provision. The revised document incorporates many changes recommended by AGC. For example, that section pertaining to payment for work completed calls for a retainage of 10% on partial estimates until 50% of the contract is complete, when partial estimates can be paid in full if good progress is being made. This provision is a big improvement over the first draft. Other major improvements have been made.

The Joint Cooperative Committee of the American Society of Civil Engineers and the AGC is reviewing the "Standard Contract for Engineering Construction" and the "Standard Questionnaire and Financial Statement for Bidders for Engineering Construction" for possible revision and republication.


Recently regulations of the Civil Aeronautics Administration were revised along lines recommended by the Joint Cooperative Committee of the National Association of State Aviation Officials and the AGC.

The association has received for study and suggestions a draft of the revised "Standard Government Contract Form 23" written by the Construction Contract Drafting Subcommittee of the Federal Standard Contracts Committee. Previously the association had made recommendations for improvements, particularly with reference to compensation for delays caused by the government.


A meeting was held June 28 by General Pick and other members of the Corps of Engineers staff and an AGC task committee on association recommendations for improvements in specifications used on civil works.

Association steps are being taken to help in contractors' equipment problems.


(Continued on page 80)




**1,100,000 BLS. OF CEMENT**—charged from this plant in 17 years of service for Koss Construction Company, Iowa.




**2,000 CU. YDS. CONCRETE IN ONE DAY**—record achieved June 28, 1948, at Levitt & Sons, Inc., truck mixer plant, Long Island, New York.





**1,250 UNIT CONCRETE APARTMENT**—the latest job for this portable aggregate plant, used previously for enormous dam, tunnel, and utility building projects in U. S. and Mexico. In service 11 years.



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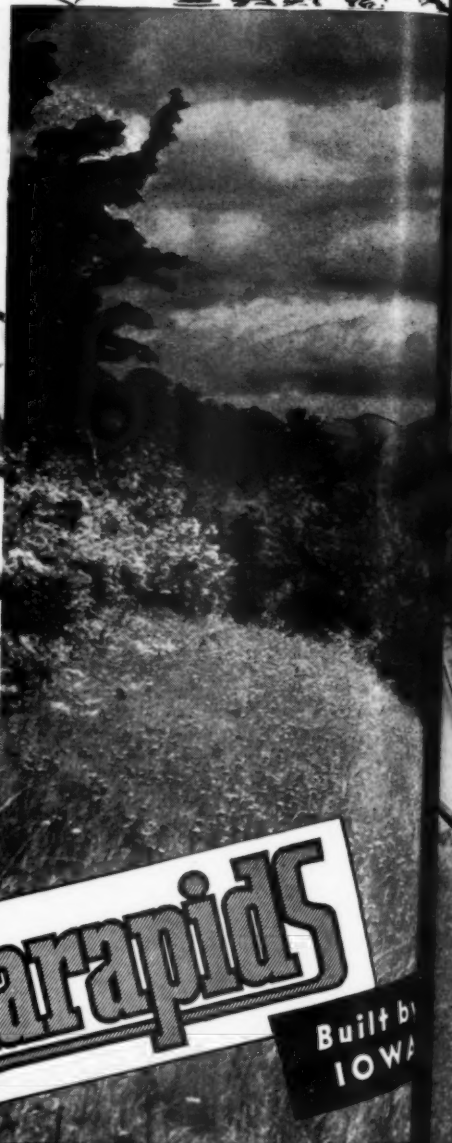
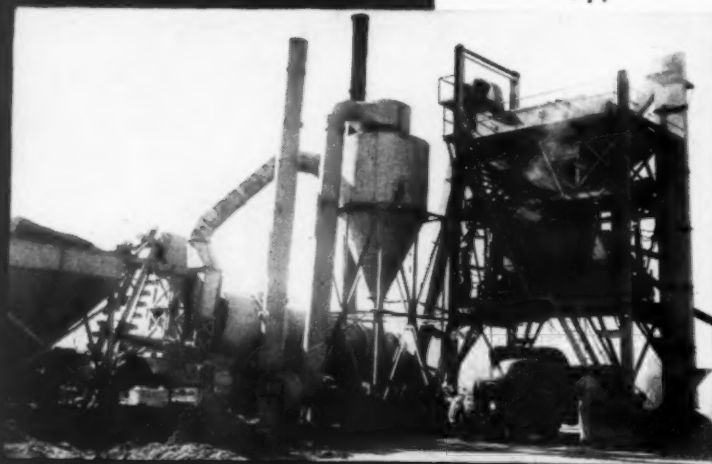
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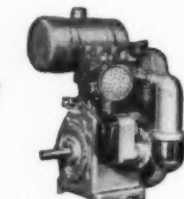
In 1947, Wisconsin Motors built 51.7% of the engines in the 2 to 5 hp. range . . . in the 5 to 9 hp. range, 36.4% . . . 71.6% in the 15 to 22 hp. range . . . and in the 25 to 40 hp. range, 14.7%. Averaged together, 40.2% of the engines in the 2 to 30 hp. range were Wisconsin — excluding automotive, aircraft and outboard marine engines, and engines for use as original equipment by various manufacturers.

These figures sum up the confidence of equipment builders and users who are the final judges in choosing superior engines where it counts most . . . on the job delivering the goods.

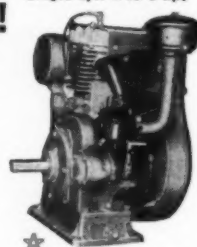


## WISCONSIN MOTOR CORPORATION

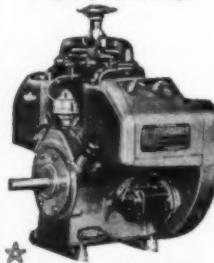
World's Largest Builders of Heavy-Duty Air-Cooled Engines  
MILWAUKEE 14, WISCONSIN



★ Single cyl. 2 to 6 hp.



★ Single cyl. 6 to 9 hp.



★ V-type 4-cyl. 15 to 30 hp.

(Continued from page 77)

AGC's revised "Contractors' Equipment Ownership Expense" manual was published July 15. It is now in its second printing. The document is a compilation of data on the average costs to general contractors of owning and operating the various kinds of construction machinery and equipment.

Two principal changes have been made. First, nearly 1,400 items were added which had not been in previous editions. Tentative percentages have been published for these items until there has been sufficient experience to determine percentages which can be substantiated. Second, sample prices for the various items have been eliminated and space has been provided in which the contractor can insert the actual price paid.

A first meeting was held September 15 by the recently established Joint Cooperative Committee with the Construction Industries Association. [See Aug. '49 R&S]. On the agenda are such topics as contractors' ideas for new equipment and improvements to current designs; claims for cost and production of equipment when in operation; long-range improvement in repair parts catalogs; construction industry developments and collaboration on problems of mutual interest; and ideas of the manufacturers.

Two accomplishments of the Joint Cooperative Committee with the Associated Equipment Distributors have been the publication of a check list for ordering repair parts to eliminate errors and avoid idle equipment, and publication of the handbook, "Proposals for Standardization and Improvement of Repair Parts Books" which can serve as a guide for working with manufacturers on a long range program.

The AGC group continues to have representation on committees of the Highway Research Board. The Association has been distributing reports on utilization of various kinds of highway equipment being published by the Committee on the Economics of Highway Construction and Maintenance Methods.

## Ohio Toll Road Estimated at \$179 Million

Basing estimates on the cost of the Pennsylvania Turnpike and the character of the terrain to be traversed both as to topography and present use, the Secretary of the Ohio Turnpike Committee, Ralph W. Sanborn, estimates the cost of construction in Ohio at \$750,000 per mile. This would amount to \$179,250,000 for the 239 mile toll road.



## Pensacola Beach Bridge

(Continued from page 47)

cule span was removed. During this operation the detour bridge was being completed for 2-way traffic and the last four pile bents were driven in the old navigation channel. By May 5 the new bridge was open for water traffic, the detour bridge was completed, and the four bents driven.

During work on the bascule piers, the deck had proceeded according to schedule, and by May 1 some 92 spans were completed.

The last twelve spans were finished by May 27, and the project was 99% completed.

The operations involved in setting the deck forms, pouring concrete and stripping deck forms and falsework were the controlling features of the time element of this job. Deck production varied from 12 spans per month to a maximum of 17 spans each during February and March, respectively, with a job average of over 14 spans per month.

Johnson, Drake & Piper's personnel: The author was superintendent; George W. Heller, project engineer, I. C. Tobey, carpenter superintendent, and R. R. Taylor, general foreman.

Sub-contractors were: Casting and driving concrete piling; Powell Bros., of Fort Lauderdale, Fla. Approaches; Ray Construction Company of Pensacola. Placement of reinforcing steel; Atlanta Steel Erectors of Atlanta. Cofferdams, detour bridge and fenders; F. Rust Smith & Sons, Inc., of Pensacola. Bascule span fabrication and erection; Nashville Bridge Company of Nashville, Tenn. Electrical work; Peake-McMorris of Pensacola. Removal of existing structure; Bernard & Byrd, Inc., of Mobile, Ala.

Russell G. Patterson was engineer-manager for the Santa Rosa Island Authority, and Harry Evans was resident engineer. Corbin Cawthon was resident engineer for Florida State Road Department.

## A Procedure for Designing Flexible Pavement and Base Mixtures

(Continued from page 63)

for maximum available lateral support  $L$ , can be calculated for each bituminous mixture from its  $c$  and  $\phi$  values or from its Mohr diagram.

17. Fig. 10 illustrates the application of this whole development to the design of a bituminous paving mixture. If the pavement must support a vertical load  $V$  of 150 p.s.i. and can develop a lateral support  $L$  not exceeding 50 p.s.i., the required stability,  $V-L = 100$  p.s.i. The curve for  $V-L = 100$  p.s.i., and  $L = 50$  p.s.i., from Fig. 4 is drawn, together with the curve for  $V-L = 100$  p.s.i. Only those paving mixtures with corresponding values of  $c$  and  $\phi$  which lie in the unshaded portion of Fig. 10 have the necessary stability and cohesion for satisfactory performance. Bituminous mixtures having values of  $c$  and  $\phi$  within the cross-hatched area, would be deficient in either stability or cohesion  $c$  insofar as the requirements of this particular design problem are concerned.

Fig. 10 indicates that left hand boundary of Asphalt Institute diagram should not be vertical, but should slope far toward the left, and should in general consist of portions of two curves. Consequently, Fig. 10 demonstrates that satisfactory stability will be obtained from bituminous mixtures having a much wider range of  $c$  and  $\phi$  values than the Asphalt Institute diagram would permit.

This approach, based in part upon  $V-L$  curves, provides minimum values of cohesion  $c$  for bituminous mixture design that appear to be in reasonable agreement with the experimental information already obtained.

Mr. McLeod's presentation went on to show how this approach could be used for determining the additional stability required in base and surface courses due to the acceleration and braking forces of vehicles. Also, how it could be employed to check the inadequacy of extrusion

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and simple compression tests for determining stability. The development would seem to have value in solving stability problems in other divisions of soil mechanics.

It should be particularly observed that this development makes it possible to design the strength or stability of flexible base courses and of flexible wearing course mixtures on a pounds per square inch basis.

There seems to be an impression among engineers that they would have to make all the mathematical calculations which Mr. McLeod and his associates had to work out in the development of his method, every time they wished to design a bituminous mix-

ture by his procedure. It should be emphasized here that this is not so. If engineers are satisfied that the mathematical derivations involved are correct, they need only employ the general equations of stability given, or easier still, only such simple diagrams as Figures 1, 3, 4, 9 and 10, which represent the application of the equations to specific data in graphical form.

The Pennsylvania Department of Highways has hired a consultant to evaluate the last ten bridges within the state now charging tolls, for purpose of eventual purchase and ending of the toll.

## City Officials Hold Public Works Congress

(Continued from page 70)

of mass transit, parking lanes, one-way use, etc.

Many elements need consideration in balance, he reminded. He warned that a definite limit must be set for urban travel speeds, probably at not over 25-30 mph in densely built up areas, and 30-50 mph in suburbs. A design speed of over 40 mph for arterial streets can rarely be justified on an economic basis.

Other points in Conner's paper: Consider truck lanes for long up-grades . . . Study traffic flow data, particularly the highest hourly flow . . . Don't overlook the possibility of greatly stepping up street capacity by widening; 11 or 12 ft. lane widths desirable for traffic, and 10 or 9 ft. widths justifiable only under special conditions . . . Wider parking lanes are desirable, up to 10 ft. for autos, as against 6 or 7 ft. commonly seen . . . Parallel parking is preferable along arterials; less traffic disturbance . . . One-way street operation still isn't used as much as it should be; various schemes need studying . . . Greater and more efficient use of buses or street cars will cut down the traffic load; trackless vehicles preferred; ample loading platforms outside the traffic stream imperative.

Use of rust inhibitors with salt was a lively discussion topic. Space limitations here prevent a full report, except for noting that much confusion and diversity of belief exists on the subject. Makers of inhibitor materials have both a technical and an educational job to do, and it is expected that the coming winter will see a great deal of trial use of various compounds.

## Ohio Tightens Truck Laws

The Governor of Ohio recently signed two measures raising the penalties for truck overloading. One provides a more explicit method of determining the load on the highways. The other stiffens the penalties for overloads, with fines starting at \$25 for the first 2,000 lb. overload. Jail sentences for higher overloads (above 5,000).

Factual data which will reveal trends in traffic volume and weights and sizes of each type of commercial vehicle, so that the part played by the highways in transportation may be more accurately appraised, are being gathered throughout Pennsylvania by the state highway department in a special survey.



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★ Fig. 1. Drilling rig with derrick lowered for travel



★ Fig. 2. Two-man drilling crew starting operations

# Soil Test Holes

## Reduce Risk in Estimating Trunk Sewers

**By Vinton W. Bacon**

Consulting Engineer, Santa Ana, Calif.

**U**NDER the best of circumstances during the postwar years, estimating the cost of construction of large trunk sewers has been a difficult and somewhat hazardous task. Practically all engineers, at one time or another during this period, have been bitterly disappointed when their carefully prepared estimates have differed widely from the actual construction costs in the end.

For bond election purposes for the County Sanitation Districts of Orange County, Calif., in estimating trunk sewer costs, the engineers were confronted with the usual difficulties inherent to the unstable price conditions and labor costs, plus the fact that the proposed large trunk sewers would traverse areas in which the subsoil and ground-water conditions were almost completely unknown. Therefore, to reduce the risk and uncertainty as much as possible, a systematic program of soil test-hole drilling was conducted as herein described.

The bond program contemplated includes 32½ miles of trunk sewers varying in diameter from 12 to 90 in. It is believed that the equipment and methods employed would be equally adaptable and valuable to much smaller undertakings.

After the preliminary engineering work had indicated the proper location and depth of the various trunk sewers, a certain amount of preparation was necessary before actual test-drilling

could be started. For instance, where crossings over private property were contemplated, it was necessary to obtain permission for the test-hole work from the owner. We offered to furnish copies of the test-hole "logs" to each land owner, and we found such to be desired by most of them.

It was also necessary to obtain permission from the state and county highway departments and the engineering departments of the incorporated cities for drilling within their respective road right-of-ways. Here again this was a simple routine matter involving a letter of request and a location map.

Where possible, the test holes were located near, but not on, street intersections. This procedure eliminated some of the field location work of the survey party. Those holes between street intersections and in the undeveloped areas were located by rough chaining. In one totally undeveloped area, the route was surveyed by stadia-transit. It should be emphasized that the data sought were somewhat general in nature, and, therefore, the hole location was not necessarily precise and did not follow any inflexible spacing or pattern of location.

Of extreme importance (even in undeveloped areas) was the location of

underground utilities and open-joint drainage lines common to agricultural areas. In most cases the utility companies and the special districts furnished certified detailed location sketches. Using these, the engineer with the drilling crew would select the final location as near as possible, usually within a few feet, to that established by the survey party.

### Drilling Rig and Equipment

An ordinary earth-boring machine of the type commonly used in Southern California by cesspool drillers, water-well drillers, and foundation men was employed with considerable success and economy for drilling the deep soil test holes. This equipment is illustrated in Figs. 1, 2, 3, 4.

Fig. 1 shows the truck with its 32-ft. collapsible derrick lowered to the horizontal position for moving from location to location. A gasoline-engine auxiliary power unit for operating the hoisting drums and for driving the ring gear and bucket is located immediately behind the cab on this rig. The turntable is at the extreme rear end of the rig. For transportation between holes (not illustrated), the auger bucket is supported on the turn table by merely inserting a heavy steel rod through holes in the side of the bucket.

The complete rig in drilling position is shown in Fig. 3. However, in our work we seldom had to use the leveling jacks shown at the rear of the rig. The auger bucket is suspended by means of a ½-in. wire rope and a 3-in. square, 22-ft. long, solid iron bar,

*State highway departments and road contractors generally should find this article useful because of the large amount of sewer work necessary as part of urban projects. The boring methods are of interest because of their wide application.—Editor*

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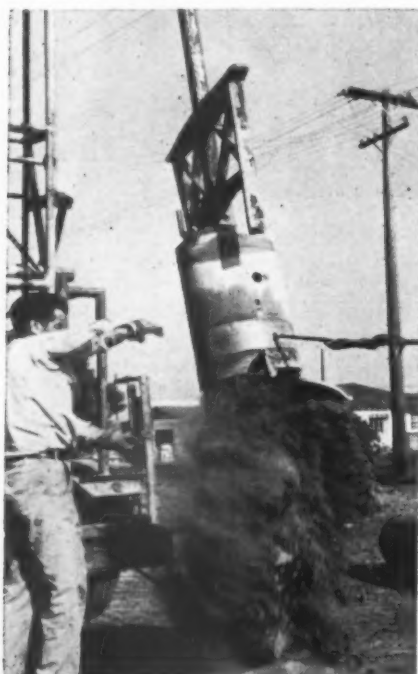
called a Kelly bar (see Figs. 2 and 3). A heavy duty thrust swivel bearing is provided at the upper end of the Kelly bar to prevent twisting of the wire rope. The Kelly bar has a truss-shaped sliding yoke which fits inside, and is engaged by, the 32-in. diameter horizontal ring gear in the turntable. As drilling proceeds, the Kelly bar merely slides downward through the yoke until the bucket has filled.

The single Kelly bar permits a maximum depth of hole of approximately 22 ft. Deeper holes can be drilled by splicing the Kelly bar to extra drill stems, but when this is done they must be taken apart each time the bucket is removed from the hole, which, of course, slows down the drilling speed and adds to the cost. Only a small number of holes were deeper than 22 ft.

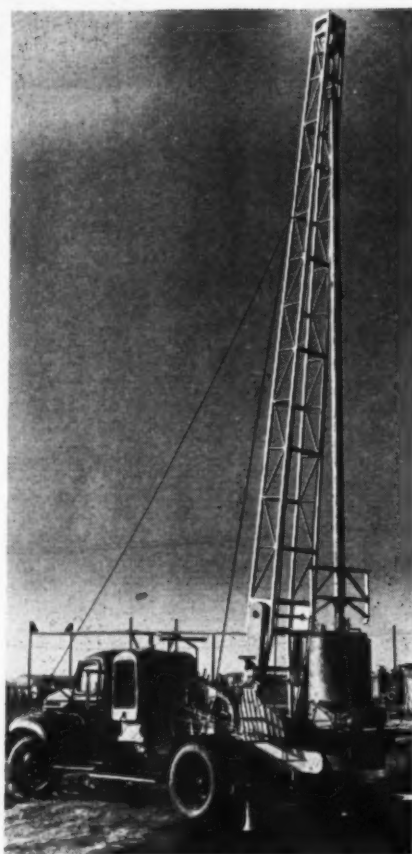
### Drilling Technique

Standard drill-bucket sizes for this rig are 16 in. and 28 in. The buckets are provided with hinged bottoms containing two cutting knives. Leather or rubber flaps are used inside the bottom to hold soils that are likely to run or flow out of the bucket while it is being removed from the hole. The latch, holding the bottom in place, is released by a half-turn of a hand crank at the top of the bucket. Fig. 4 shows this hand crank on the bucket being emptied, after having been pushed clear of the rig.

The drilling program to be described was designed to yield sufficient information on the subsoil and ground-water conditions to permit the preparation of construction cost estimates for the Engineer's Reports required in advance of the bond elections. Spacing



★ Fig. 4. Emptying bucket pulled clear of rig.



★ Fig. 3. Drilling rig with 32-ft. derrick raised to drilling position

of 1000 ft. between holes was assumed to be adequate. Actually 141 holes were drilled along the 171,500 ft. of proposed sewer line. Depth of hole varied from 10 to 30 ft., average being 16.3 ft. In general, the holes were drilled 3 ft. below the invert line of the proposed sewer grade.

The 16-in. bucket was used throughout the job except where rocks and boulders larger than 4 to 6 in. were encountered. The openings in this size bucket would not pass the larger rocks, and, therefore, it was necessary under these conditions to use the 28-in. bucket.

In clay, adobe, and damp coarse sand, the hole would stand for its full depth; but when fine sand, silt, or ground-water were encountered, the hole would start to cave in. Caving was rarely experienced at less than the 8-ft. depth, the average being more nearly 12 ft. In order to hold the sides in place and to continue drilling in the "running" soils it was necessary to use an 18-in. steel casing in conjunction with the 16-in. bucket. When caving was encountered at the bottom, the bucket was pulled and fitted with a small reamer fin, which enlarged the hole sufficiently to take the 18-in. casing. After reaming the hole down to the caving level, the bucket was removed, the casing was placed, and drilling without the reamer attached

was resumed. The weight of the steel casing in the wet or running soil was sufficient to cause it to follow closely behind the bucket without further reaming. As the casing settled, additional 2-ft. lengths were bolted to the top section. Naturally, it was just this type of subsoil that we were desirous of locating and determining the extent of, as sewer construction in such soil is the most difficult and expensive. Some test-hole drillers maintain and hold the sides of the hole by keeping it filled with rotary mud. However, in our work we avoided use of the mud, as we desired a "cleaner" sample than that obtainable from the admixture of soil and rotary mud.

Drilling was stopped wherever solid rock was encountered unless it was believed that the "rock" consisted of only a thin layer of shale, which type of structure is not uncommon in the bluffs along the coastal and beach areas. After piercing these thin layers of shale by repeatedly hoisting and dropping a heavy chuck bit into the hole, drilling was resumed in the usual manner with the bucket. Fortunately, very little true rock was encountered during drilling operations.

Although it was possible to backfill using a small blade or Fresno in conjunction with the hoisting drums, experience indicated that it could be done more quickly and efficiently by hand, the helper on the rig doing the job. This procedure allowed more efficient use of the rig in that it could be sent ahead for setup at the next hole. Compaction of the refilled hole was accomplished by driving a light truck back and forth over the filled hole a number of times. It was possible to locate all holes off the roadway, and, therefore, no resurfacing was necessary.

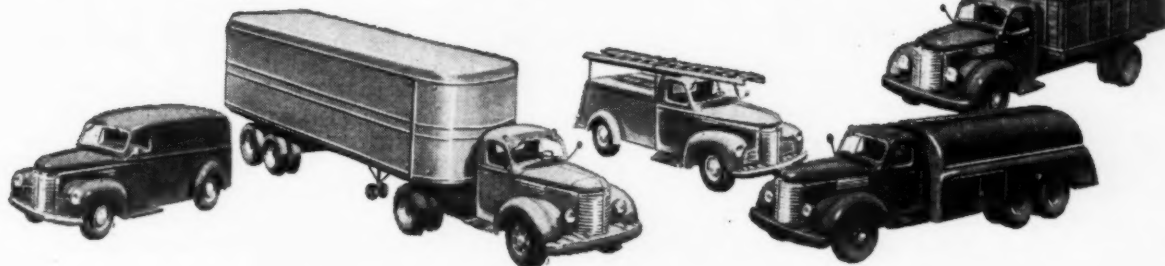
(Continued on page 88)



★ Fig. 5. Engineer taking soil samples from jaws of bucket



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### Summary of Cost of Drilling Soil Test Holes

Item of Cost	Cost		
	Total	Per Foot Of Hole*	Per Hole*
Drilling rig with 2-man crew; 240 hr. @ \$10.00/hr.....	\$2,400.00	\$1.04	\$17.03
Steel casing, 18 in. diam. 2 ft. lengths: 24 ft. @ \$5.82/ft.....	139.68	0.06	0.99
Sample jars, pint, wide mouth, Kerr: 443 @ \$7.82/C.....	34.64	0.02	0.25
Miscellaneous supplies (lath, flagging, planking, etc.).....	26.21	0.01	0.19
Mileage and transportation.....	81.52	0.04	0.58
Sub-Total.....	\$2,682.05	\$1.17	\$19.04
Engineering inspection and sampling.....	625.00	.27	4.43
Total.....	\$3,307.05	\$1.44	\$23.47

\* Unit cost is based on following drilling record:  
 Total length of hole drilled.....2302 ft.  
 Number of holes drilled.....141  
 Average depth of hole.....16.3 ft.

Total drilling time.....240 hr.  
 Average length of hole per 8-hr. shift.....77 ft.

(Continued from page 86)

Holes were located a safe distance from overhead lines to avoid the possibility of snapping of the hoisting cables and contact with power lines.

In order to complete the work in the short time available, the rig was operated 16 hours per day for a total of 15 days. With proper lights available on the rig, night drilling was only slightly more difficult than day work. At night, every effort was made to select locations away from dwellings.

An engineer was assigned to the drilling rig at all times to keep the







time records, to maintain the drilling log, and to take soil samples. Fig. 6 shows the Record Form for Soil Test Data, complete with the actual field data for Test Hole No. 22. As shown by the record for this hole, caving was encountered below the clay cap at a depth of 10.5 feet, and 18 feet of casing had to be set to complete drilling. Ground-water was encountered at 12 feet, and the engineer made the general note that difficult trenching and excavation would be experienced.

Soil samples were taken wherever there was a change in the type of soil.

### RECORD FORM FOR SOIL TEST DATA

Test Hole No: <u>22</u> Inspector: <u>Sweet (Day shift)</u> Date: <u>10-20-48</u>	
Location: <u>BUSHARD ST. &amp; ATLANTA AVE. (STA. 130+00)</u>	
Contractor: <u>Gentry (Operator: Barber)</u> Drilling Time: <u>6:20-8:20 am.</u>	

DRILLING LOG		REMARKS
Sample No.	0	Grd. Elev. (USGS) = <u>80'</u>
		<u>Loam (topsoil)</u>
		<u>Set casing when drilling reached 14' Depth.</u>
		<u>Used 18' of casing</u>
	5	<u>Brown clay - gummy</u>
		<u>Grey clay - very gummy</u>
	10	<u>Trickle of water (10.5')</u>
		<u>Grey silt - not very wet</u>
		<u>Grey silt - getting wet (started caving)</u>
		<u>Form of caving</u>
	15	<u>Grey silt - ground water</u>
		<u>Grey silt - getting coarser - some shells</u>
	20	<u>Grey silt - many shells</u>
		<u>(NOTE: Difficult trenching below 10.5')</u>
		 Sand
		 Gravel
		 Clay
		 Rock
		 Topsoil (Loam)
		 Silt

★ Fig. 6. Record form used for recording soil test data

A total of 443 samples were taken for the 141 holes drilled, or an average of 3.1 per hole. These samples are preserved in sealed, pint (wide-mouth), fruit-canning jars, and they, together with the drilling logs, will be made available to all contractors when bids are called.

Fig. 5 shows the engineer taking a sample by reaching up into the bucket through the bottom openings, thus obtaining a truly representative sample. Sampling from the top of the bucket was not practiced, as often clods of soil would fall into the bucket as it was being removed from the hole.

### Cost of Drilling

Cost of the drilling work is summarized in the accompanying table. The cost averaged \$1.17 per foot of hole exclusive of engineering inspection and sampling, and \$1.44 per foot including inspection and sampling. The 18-in. steel casing can be used on future drilling jobs. On small jobs where only a few holes are desired, the cost of the casing can be eliminated through the use of rotary mud to prevent caving. The cost of surveying and utility location has not been included as these items will depend entirely upon the characteristics and development of the area under consideration. No mobilization and demobilization charges were made by the contractor since his yards were very near to the job.

Drilling progress of 77 ft. per 8-hr. shift was somewhat slower than had been anticipated, and, therefore, the unit costs were slightly higher than expected. Since many of the "bugs" were worked out on this job, greater progress and lower unit costs are expected on our future jobs.

### Summary

Soil samples and drilling records indicated where excavation and trenching would be difficult and costly and where the various dewatering methods would be adaptable. The work indicated those trunks which had to be relocated or raised in grade, where this was feasible. It separated what can ordinarily be called "easy construction" from that involving considerable risk. The program served to eliminate much of the fear that accompanies uncertainty as to subsoil and ground-water conditions.

Gentry Cesspool Service was the drilling contractor. Charles A. Sweet and Walter E. Brelje served as engineering inspectors on the job. The photographs of the work were furnished by Joseph C. Gallant of the Orange County Health Department and by California Welding and Blacksmith Shop of Los Angeles.

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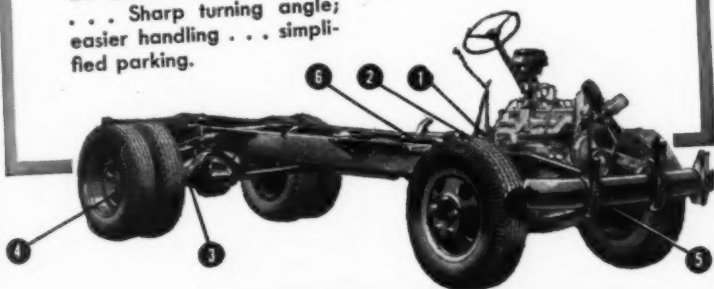
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A new tilt deck trailer, announced by Rogers Brothers Corporation, Albion, Pa., carries four 8.25 in. x 15 in.—14 ply tires and has a capacity of 7 tons. The road clearance is 16 in. The deck is 16 ft. x 8 ft. and 34 in. high. Air or vacuum

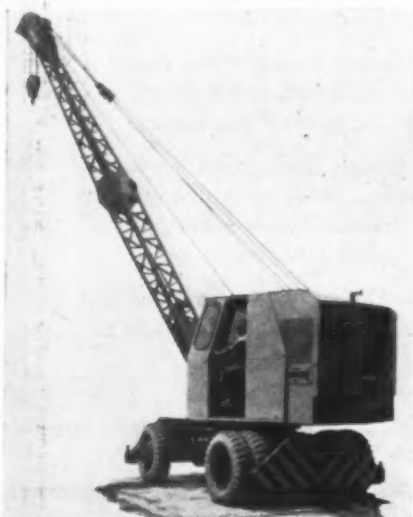


Rogers New Tilt Deck Trailer

brakes are optional. An interesting feature is the double acting hydraulic ram which cushions the deck when being raised or lowered. A 5-ton trailer is also available equipped with 7.50 in. x 15 in.—10 ply tires.

#### 2 Mobile Crane

A new mobile crane, Model MC-41, with 6½ tons rated capacity introduced by Hanson Clutch & Machinery Co., Tiffin, O. is similar in most specifications to the crawler mounted Model 41, a standard unit in the Hanson line. The new crane can be equipped with all the attachments—shovel (½-yd.), trench-hoe, clamshell or dragline. Mounted on rubber, it features four-wheel air brakes, air steering and optional two or four wheel drive. All operations are controlled from inside



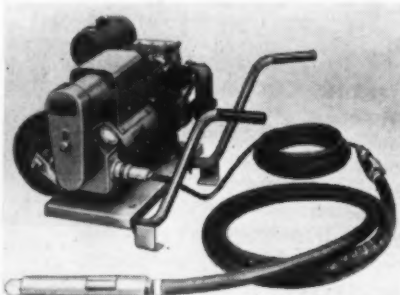
Hanson Model MC-41 Crane

the operator's cab. Tests have shown that this mobile unit is unusually steady during the entire operation cycle, regardless of the attachment used. A live boom mechanism is furnished where speedy raising or lowering of the boom is desirable. General specifications include: Full revolving, chain crowd, welded steel

construction, ball or roller bearings at all vital points, disc type clutches on swing—internal expansion, booster type clutches on hoist and crowd, air controlled steering, all clutches easily and quickly relined without removing shaft assemblies, heavy duty industrial type motor, gasoline or diesel.

#### 3 Electric Concrete Vibrator

A new concrete vibrator announced by Maginnis Power Tool Co., Mansfield, O., has no flexible shaft, contains a 180 cycle motor in the head, weighs only 12 lb., and is only 2½ in. in diameter. It has a conveniently located on and off switch and is operated by one man regardless of the type of work on which it is used. A gasoline engine driven generator developed by the company operates two vibrators simultaneously or



Hi-lectric concrete vibrator connected to generator by 50 ft. cable

one vibrator and 1000 watts of 110 volt floodlights. When used as a light plant only it provides 2500 watts of flood light. The generator weighs 300 lb. The line cable may be any length up to 200 ft. from vibrator to generator. In operation the generator is set off the job, out of the way, and need not be moved or attended. Thus the lightweight vibrator head is all that is moved around as concreting progresses.

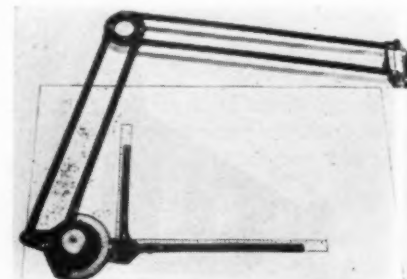
#### 4 Drafting Machine

A new drafting machine, announced by L. G. Wright, Inc., Cleveland, O., mounts at the extreme right corner of the drawing board instead of the center

#### Mail Inserted Card For More Information on These Products

See business reply cards in this publication. Just enter the number or numbers of the new products items on which you want further data, fill in address, and mail to the Editors. We'll pass your request to the manufacturers without obligation.

or left corner. It permits free movement of the scales over the entire drawing area without interference. The machine is designed for the thousands of

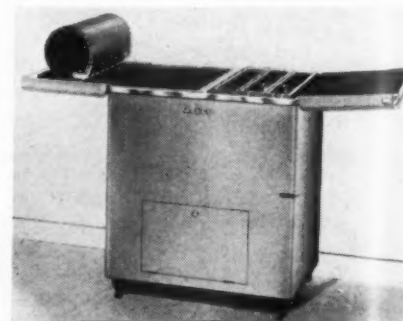


Wrigraph Model D rafting Machine

smaller drawings made in every organization. It is a portable unit for the individual use of technical men who want to carry a machine with them for use anywhere. The drawing area is 20 x 26 in. The machine is easily fastened to any board or table. The ball-bearing precision drafter is accurately calibrated through eccentric adjustments built into the mechanism. Interchangeable engine-divided scales in all of the standard graduations are available. The lightweight protractor can be locked at any angle.

#### 5 Photo Copy Equipment

A new development in photo copy equipment, announced by American Photocopy Equipment Co., Chicago, Ill., makes available a complete outfit with all component parts in one movable cabinet that occupies only 26 x 16 in. of floor space. When the top of the cabinet is opened, the contact printer is ready for instant use. Prints are then



Apco Cabinet Photo Copier

placed into stainless steel holders and quickly developed and fixed merely by inserting them in the proper slots—without being touched by the hands at any time. An ingenious electric dryer compartment completes the process which, in a few seconds, produces perfect, exact copies of letters, drawings, photos, documents, records and forms up to legal size. No special dark room is required as this unit operates in sub-

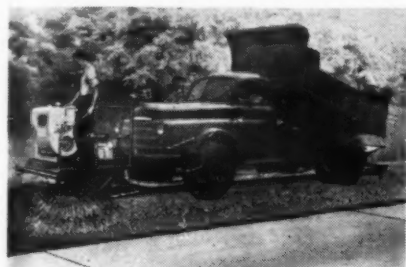
duced light of any office. Copies and dryer operate from one electrical outlet—110 volts A.C. or D.C.

## 6 Curing Blanket for Concrete Roads

An improved curing blanket, for concrete road construction, has been announced by Union Bag & Paper Corporation, New York, N. Y. under the trade name "Scutan." The new blankets, made from an improved grade of Scutan, meet all requirements of the National Bureau of Standards' present UU-P264 Concrete Curing specifications including the proposed changes. These changes relate to construction and scuff resistance specifications and improved tests for tensile strength, puncture, shrinkage and moisture vapor transmission. The New York State Highway Commission recently tested and gave their full approval to the blanket. Scutan is supplied in jumbo rolls 12 ft. wide.

## 7 Front-end Spinner Puts Carpet under Truck

Trucks spreading chips in the wake of the bituminous distributor can travel forward while spreading, yet avoid tracking through the fresh application by use of a new device called the "Roadsaver". Manufactured by Gabb Manufacturing Company, 16 Orchard St., East Hartford, Conn., the equipment is a surface material spreader which fits under the chas-



"Roadsaver" Spinner

sis of an ordinary dump truck. A frame extends under the truck, and on it, in the rear, is mounted a hopper which receives material from the tailgate. Material passes under the truck along an endless belt, to a spinner with power unit mounted in front.

This easily demountable unit can be adjusted to spread any amount of material per foot of travel, and spread any width up to 20 ft. For further facts, address the company as given above.

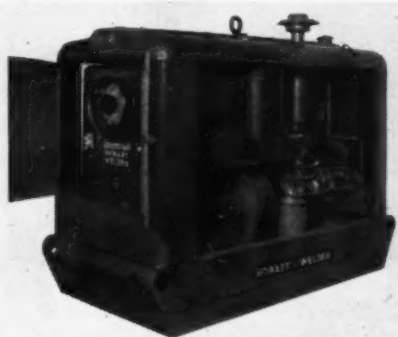
## 8 Rubber Compound for Paving

A new "meltable rubber" compound, engineered specifically for highway surfaces, developed by the Naugatuck Chemical Division of United States Rubber Co., Rockefeller Center, New York 20, N. Y., is being used in a cooperative test by the office of Manhattan Borough President and the United States Rubber Co. on six sections of streets in New York City. The rubber compound, known as Surfa-Sealz, was blended with the asphalt. The compound was specially designed to mix easily and completely with asphalt. The mixing can be done on the job or in the asphalt plant. In the New York experiment approximately 200 tons

of pavement surfacing containing rubber are being laid in areas which carry heavy city traffic.

## 9 Welder

A new line of low-cost welders has been developed by the Hobart Brothers Co., Troy, O., to be known as the "Bantam Champ" DC arc welders. The one illustrated is the gasoline engine driven Model ZXB-200-S. This model is rated 200 amperes at 25 volts on 50% duty cycle. The current range is from 25 to 230 amperes at an operating speed of



Model ZXB-200-S Welder

2200 r.p.m. It is 55 in. long, 22 in. wide, 38½ in. high (incl. exhaust), and weighs approximately 770 lb. The generator is a modified multi-range type with 4 laminated main poles and 4 interpoles which are removable. Four heavy duty generator brushes are held in a fixed neutral position by patented single unit brush rigging. Its welding controls are modified multi-range dual control, with 5 ranges of welding current and 100 steps of volt-ampere adjustment in each range, making available 500 combinations of open circuit voltage and welding current for selecting any desired arc characteristics.

## 10 Blasting Control

A specially designed instrument developed by the American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass., measures minute vertical, horizontal and transverse earth tremors resulting from a blast. The tremors,



Accelerometer for Recording Blasts

magnified 400 times, are recorded photographically by a pencil of light on motion picture film. They indicate the factor of safety present in the control of blasting. On any specific job, through data obtained in a series of preliminary shots, a schedule of safe maximum charges is worked out. The amount of explosive set off at any one instant is then limited to the calculated safe amount. By means of "delays," a series of such small shots are set off at inter-

## New and Improved Products

### Reported in this Issue

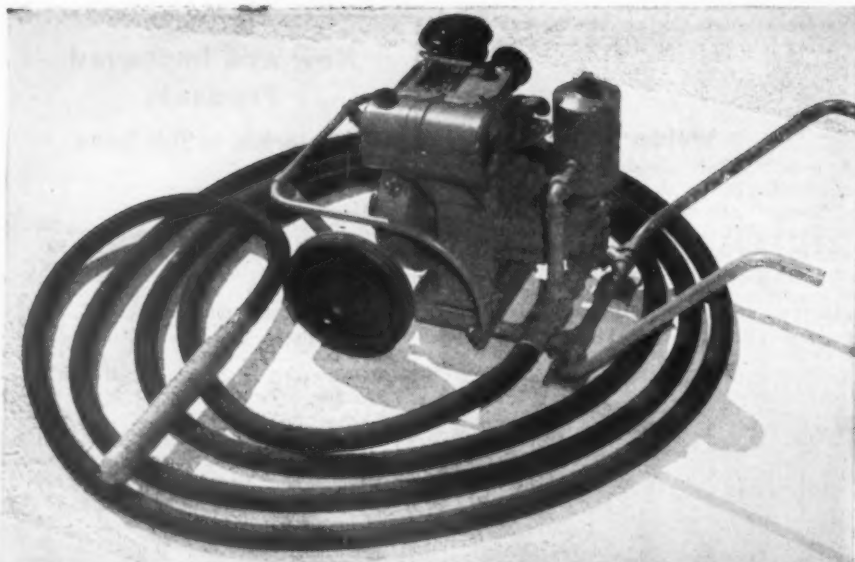
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vals, and are used to comprise a round. Periodic check by engineers determines the continued safety of the blasting as the project progresses and eliminates possible danger to buildings. Where the accelerometer test point is distant from the blaster as in tunnel work, a "Handie-Talkie" radio is used for communication. This enables the accelerometer technician to synchronize his operation of the equipment with the actual firing of the round.

## 11 Material Hoisting Towers

Beaver Art Metal Corporation, Ellwood City, Pa., has started to fabricate materials hoisting towers for the construction industry. Dravo Corporation, Pittsburgh, Pa., has been appointed exclusive national distributor for the towers. Known as "Beaver" tubular steel hoisting towers, they are supplied in two types for heavy duty and light duty work. The heavy duty type, designated as No. 5000 has a live load capacity of 5000 lbs., or a 35 cu. ft. concrete bucket. The light duty type (No. 3200) has a live load capacity of 3200 lbs. and can be erected to a maximum height of 200 ft. Both towers are available in the three-wheelbarrow cage size, and in both single and double wells.





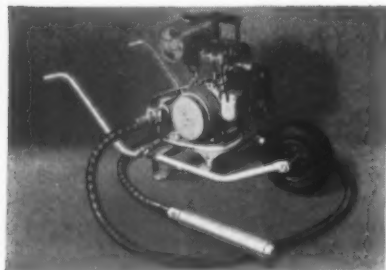
## THE JACKSON HYDRAULIC



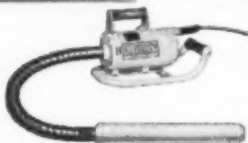
**Saves a "WHOPPING"  
amount of time  
and effort!**

When you place this concrete vibrator, *with its 50 ft. reach*, on the job, every bit of concrete poured within a 100 ft. circle can be thoroughly vibrated without changing the location of the machine; the

hard-to-get-to places become quickly accessible, non-productive time is drastically cut and the job proceeds faster and more profitably. Tough, trouble-free and highly efficient. Write for complete details.



Model FS-6A. Flexible shaft. Gas-engine drive. Available with 3 heads for thick or thin sections. Flexible shafting in 7' to 14' lengths up to 28' grinding and other attachments.



Model FS-7A. Flexible shaft. Electric. Ideal for decks, thin walls and with short shafts for spud work.



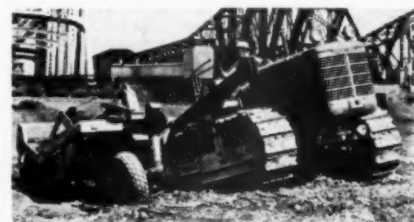
### MUNICIPAL PAVING UNIT.

Manually guided paving machine and portable power plant. Easily places upward of 65 cu. yds. of stiff mix concrete per hour. Undercuts at side forms. Strikes off to crowns, regular and inverted; works around manholes, etc.

**ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan**

## 12 Tractors

New, more powerful, "A" models of the International TD-18 and TD-14 diesel crawler tractors, have been announced by International Harvester Co., Chicago, Ill. Both the TD-18A and TD-14A, now in production, have greater work capacities than previous models, and incorporate a number of new features designed for increased operator comfort and longer



Model TD-18A Tractor

trouble-free service life. The heavy-duty TD-18A, second largest in International's line of five diesel crawlers, has 87 drawbar horsepower, compared with 80.5 in the previous model. Net engine horsepower at the flywheel, which was 97 in the last model, is now increased to 107. Belt horsepower, previously 91.5, has been raised to 101. Drawbar pull is at a new high of 22,400 lb. in first gear with engine operating at maximum



Model TD-14A Tractor

torque. The drawbar has been strengthened by welding, in addition to riveting. For improved traction, wider, 20-in. shoes are now standard. This model has six speeds forward, to a high of 5.7 miles per hour, and two reverse, up to 3.5 miles per hour. In the TD-14A, third largest of the crawler line, horsepower has been increased to 76 at the engine flywheel; 60.5 drawbar, and 72 belt. With the added power, this tractor has higher maximum drawbar pull of 16,600 lb. in first gear. The TD-14A has the same speeds as the TD-18A.

## 13 Spreader

A spreader for hot or cold mix asphalt or stone base courses is a recent addition to the line of asphalt equipment made by W. E. Grace Manufacturing Co., Dallas Tex. It is claimed to be especially suited for driveways, parking areas, widening work, and will work in close quarters. The device is drawn by a truck, which dumps its load in the spreader and travels forward to spread the material. Attachment to almost any make truck is possible by an inexpensive quick acting hitch clamped to the truck axle. Wheels carrying two 6.00-9 six-ply tires adjust vertically to take part of the load, provide a leveling action, and raise the spreader clear of the surface for transporting or backing. Depth of spread is adjustable from 1 to 8 in. Widths furnished are 7 and 9 ft. Blocking to any lesser width is easily accomplished. A traction driven agitator is available as extra equipment on the 7 ft. and is connected through a clutch to the



spreader wheels. The agitator is regular equipment on the 9 ft. model. The spreader may be had on special order in 4 or 5 ft. width for sidewalks or widening work where overall width must be kept below 8 ft.

#### 14

##### Scraper

The Model C-314 has been added to the line of tractor drawn earth moving scrapers of La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. The new unit replaces the C-114. The Model C-314 has a capacity of 14 yd. struck and 17.5 yd. heaped. It is particularly designed for use with the newer larger tractors. It can be equipped with a



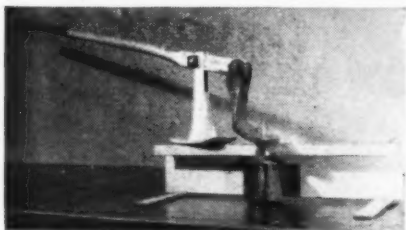
Model C-314 Scraper

combination of different tire sizes starting with 18.00 x 24's up to and including 21.00 x 29's. Another feature of this unit is its interchangeability with the scraper unit S-300 of the TS-300 motor scraper. By changing the main frame and tires, if necessary, and the addition of rear wheel brakes, the unit can be hooked directly to the T-300 tractor to make a high speed, self-propelled unit. Conversely, the scraper unit now used with the TS-300 can be converted to use with track-type tractors when extreme operating conditions make it necessary.

#### 15

##### Form Pin Puller

A useful device for pulling stakes from road forms, placed on the market by Tigerman Engineering, 627 E. Silver Spring Drive, Milwaukee, Wis., holds the form down while it pulls the pin up. It works like a pump and eliminates the need of bending down to attach the jaws to the pin by hand. The jaw is attached



Jiffy Form Stake Puller

to the pin by the handle, then an easy downward push lifts out the pin. The jaws of the puller are made of superior alloy heat treated steel and the gripping surfaces are face hardened. The rocker post is made of high grade steel and the handle is of heavy steel.

#### 16

##### Electric Chain Saw

A new lightweight tree saw developed by Mall Tool Co., Chicago, Ill., will cut off branches up to 12 in. in diameter 15 ft. above the ground. In addition, it also is claimed this saw will fell, buck and limb trees up to 24 in. in diameter, cut heavy piling and timbers when detached from pole and used as a hand power saw. It is easy to operate and so light in weight—only 10 lb.—that any adult person can use it successfully by simply plugging it into any 110-volt,

*"Speaking of truck shovels.....  
Why did you buy a MICHIGAN?"*



What other  $\frac{3}{8}$  or  $\frac{1}{2}$  yard truck shovel has all these features?

- ... cast steel turntable with deck and side-frames cast in one piece, insuring constant true alignment of shafts and bearings, longer trouble-free service.
- ... all shafts splined and ball bearing mounted plus machine-cut gears and sprockets for smoother, longer-lived operation.
- ... interchangeable turntable shafts, bearings and clutches.
- ... tapered hook rollers, ball-bearing mounted, easily adjustable for wear.
- ... air-ram operated clutches that are fingertip controlled—that are fast, positive, dependable.

From wheels to boom-point you get more fast-production, cost-cutting features in a MICHIGAN. That's why I selected MICHIGAN... and it's why I say you'll get the most for your money in a MICHIGAN!

Write for your copy of Bulletin 100, "On the Job with MICHIGAN," showing MICHIGAN Truck Shovels on jobs like yours.

**MICHIGAN**

**MICHIGAN POWER SHOVEL COMPANY**  
480 Second Street  
Benton Harbor, Michigan

#### DID YOU KNOW

you can buy  
a brand new  
**MICHIGAN**  
**TRUCK CRANE**  
complete with chassis  
for as little as \$10,250  
F.O.B. factory?

60 cycle or direct current light circuit. It can also be operated from a small 750-watt gasoline engine generator that can be picked up and carried about like a satchel.

## 17

### New Barco Rammer

A gasoline-engine-powered earth rammer, hand held and strictly one-man in its operation, has been developed by Barco Manufacturing Company, 1841 West Winnemac Ave., Chicago 40, Ill. Called the Barco "Pegson" Rammer, it is developed as an inexpensive and efficient means of compacting soils, especially in areas where rollers cannot reach. Abutment corners, backfill around culverts, pipe, bridge piers; subgrade and base areas in pavement repair work—these are some of the suggested spots of use.

Said to cover 1 to 1½ sq. yd. of area per minute, the machine is designed for simple and easy operation. Anyone can start and operate it. While motor is running, it can be made to walk itself from place to place on the job.

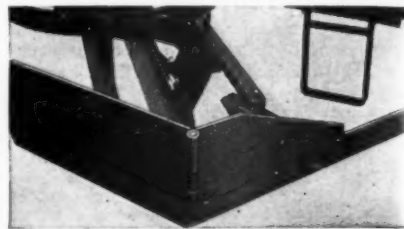
The machine is entirely self-contained. Ignition is by magneto, tripped by the hammer's upstroke. The rammer operates on a modification of the rocket principle. Lubrication is secured from oil mixed with the gasoline fuel. The machine weighs about 200 lb. For further details write Barco address above, asking for catalog No. 620.

## 18

### Berm Maintenance Tool

A new grader attachment for filling ruts, washouts and holes in berms and

reshaping the berm flush with the surface of the pavement, in one operation, has been announced by The Galion Iron Works & Mfg. Co., Galion, O. The attachment consists of a deflector plate (left side of photo) a distributing or strike-off blade (right side of photo) and connecting parts. It is attached to and works in conjunction with the motor



**For Tough Mixing Jobs...The New Heavy-Duty Moto-Paver**

For heavy bituminous mixing, retread and stabilization jobs—under the toughest kind of operating conditions—the new heavy duty Moto-Paver delivers dependable, low-cost performance.

Developed especially to meet the rugged conditions of hilly

and mountainous terrain, this new and more powerful Moto-Paver has proved equally efficient under widely different conditions in various sections of the country.

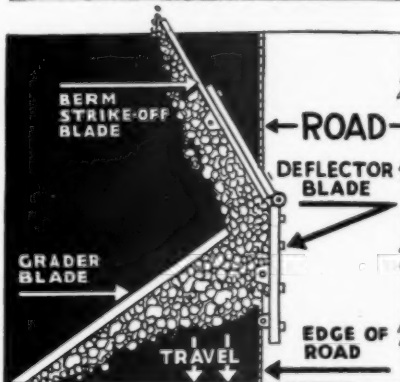
See your local H & B distributor or write direct for specifications and complete information.



**HETHERINGTON & BERNER INC.**

721 Kentucky Avenue, Indianapolis 7, Indiana

Based on design proven by three years successful operation of the standard model, the heavy duty Moto-Paver includes a larger 8-cylinder mixer engine, a larger belt-fed truck hopper and improved bitumen control as standard equipment. Windrow loader, heavy duty air cleaners, transfer pump and other optional equipment are available to meet special operating conditions.



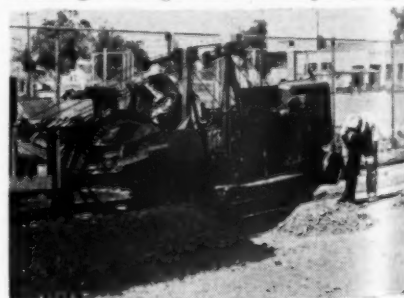
**Galion Berm Shaper Attachment**

grader moldboard and circle. The deflector plate lines up squarely with the front and rear wheels of the grader, and rides on and parallel with the edge of the pavement. The grader blade reshapes the uneven berm. The excess material flows off the end of the grader blade against the deflector plate of the attachment, and passes on to the strike-off blade (see sketch). The concentration of excess material in the corner of the deflector is said to assure a complete filling and reforming of the berm against the edge of the pavement. The angle of the strike-off blade, and the hinged section of the deflector plate to which it is attached, is adjustable to suit varying materials and operating conditions. The Galion Berm Shaper Attachment is designed for use with the Galion No. 402 Maintenance Grader.

## 19

### Trencher

A new, small, compact model of the Cleveland "Baby Digger" trenching machine has been placed on the market by The Cleveland Trencher Co., Cleveland, O. Known as the Baby Digger Model "92", the new machine is claimed to be especially adapted for gas, water and sewer house services, for telephone and power cable and conduits, for house and building footings and for airport, high-



**Baby Digger Model 92**

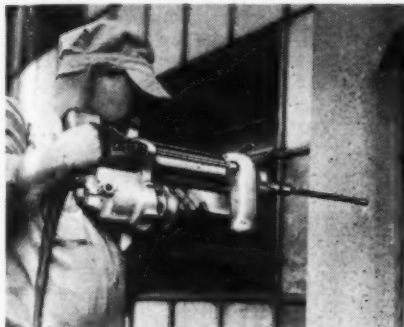


way and farm drainage and irrigation. Chief advantages claimed for the new "92" are its small compact modern size—allowing easy maneuvering in tight places and quick moves from job to job on its own rubber-tired tilt-bed electric-braked trailer—and its ditch capacities (up to 5 ft. deep and 10 to 20 in. wide). Other new features are: clog-proof crawler tracks; operator-controlled power-shift conveyor giving instant control of the spoil bank; patented "Presto-Points" for quick and easy replacement of rooter teeth.

## 20

### Electric Hammer Drill

A new type of Syntron electric hammer put on the market by Syntron Co., 384 Lexington Ave., Homer City, Pa., is stated to be the first electric hammer to both hammer and rotate the drill bit at the same time. Syntron has also developed a new line of drill steels to use with these new hammers, with carbide cutting edges and spiral flutes. The hammer will drill up to 2-in. diameter holes, is of electro-magnetic design



Model 25-RO Rotating Hammer

with a free-striking piston, has an automatic safety clutch on the rotating drive that will slip if the bit binds or gets stuck in its hole, the percussive hammering can be stopped while the bit continues to rotate to clean the hole, weighs 38½ lb. and is identified as the Model 25-RO Rotating Electric Hammer. It is available for either 110 or 220 volt A.C. operation.

## 21

### Paving Breaker

A new RC-80 paving breaker has been added to the line of pneumatic tools of the Cleco Division of Reed Roller Bit Co., Houston, Tex. This tool incorporates the new Reed-Cleco rock drill type valve which gives full control of both power and reserve stroke. The reversible grooved piston is cushioned on the power and return stroke, reducing operator fatigue and eliminating side rod breakage. An air reservoir in the back head assures uniform air pressure to the piston. Oversize air porting assures longer effective stroke and full pressure on the piston during the power stroke. A large oil reservoir provides automatic lubrication and a pressure seated throttle valve gives positive shut-off and accurate control.

## 22

### Scrapers

Two new pieces of literature have been released by LaPlant-Choate Manufacturing Co. Inc., Cedar Rapids, Ia. "Better Than Ever Before" is a broadside describing the TS300 Motor scraper. In addition to complete specifications on the unit, the broadside covers four steps of scraper features under the headings of Loading, Hauling, Spreading and Servicing in

great detail. Actual job photos and descriptions are also used to accentuate the various features. The broadside is identified by Form A1210. "Improved LaPlant-Choate TS300 Motor Scraper" is a 4-page folder describing all improvements and original features now available in the motor scraper. Case histories of actual jobs showing hours worked, yards hauled, etc., are also described. The folder is identified by Form A1209.

## 23

### Concrete Subgrade Paper

A new, exceptionally tough concrete subgrade paper, known as Leatherback subgrade, announced by Protective Papers, Inc., Union, Ill., meets all specifications for a subgrade paper with A.A.S.H.O. designation M 74-38. It is an asphalt saturated paper weighing a minimum of 40 lbs. per 1,000 sq. ft., the guaranteed asphalt content of the paper being at least 50% of the weight of the untreated paper. The papers are stated to have a bursting strength of 40 lb. or more when dry, and at least 20 lb. after immersion in water for one hour at 70-80 F. Tensile strength per inch of width of paper is 45 lb. in the machine direction and 25 lb. in the cross direction. Leatherback Subgrade papers are furnished in 36 in. and 48 in. rolls, each roll totalling 1,000 sq. ft.

## 24

### Tractor Snow Plow

Snow plow attachments, both "V" and reversible blade types, are now available for the 4-wheel drive, 1½ cu. yd. Model HM Payloader of The Frank G. Hough Co., 871 Sunnyside Ave., Libertyville, Ill. These plows readily interchange with the bucket. Features of this ma-

**LIGHTER**

**STRONGER**

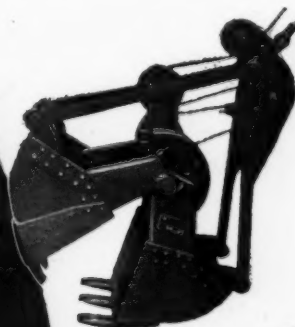
**WELLMAN**

*Williams Type* **BUCKETS**

Stronger because they're constructed of welded rolled steel... lighter because non-essential weight has been eliminated. Wellman buckets meet every requirement of heavy service with longer life and lower cost! A type for every service: Multiple Rope, Power Arm, Dragline, Power Wheel, Special Service. ⅓ to 16½ yd. capacity.

SEND FOR BULLETIN

**THE WELLMAN ENGINEERING COMPANY**  
7003 CENTRAL AVENUE CLEVELAND 4, OHIO



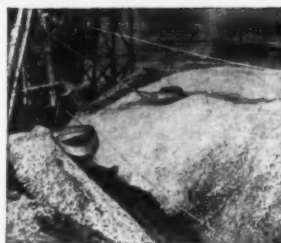


# DIG-HAUL-DUMP



Sauerman Stackline Cableway digs reservoir 400'x200' in area and places the spoil (80,000 cu. yd.) in a single wide pile.

*for a  
FEW  
PENNIES  
a yard!*



165,000 cu. yd. of sand, gravel and stone is moved from stockpiles to central mixing plant by 3 small Sauerman Scrapers.

## *Long Range Handling at Lowest Cost*

**SAVINGS** in first cost, time and labor are your direct gains on dig-and-haul jobs with a Sauerman Drag Scraper or Cableway.

**ONE-MAN CONTROL**, fast and positive action. Reaches across a river, pond, pit or stockpile, or to top of hill—moves material from any point within cable radius, and dumps automatically wherever desired.

Whether you handle small or large daily yardage, we can supply the size and type of equipment exactly suited to your needs.

Write or wire for Sauerman Catalog. Let us advise you on your specific jobs.

**SAUERMAN BROS., INC., 588 S. Clinton St., Chicago 7**

# ELECTRIC WHEELS

## Designed to do the Job

Wheels and Axles are our business, and our engineers are well qualified to recommend the most efficient assembly for your product.

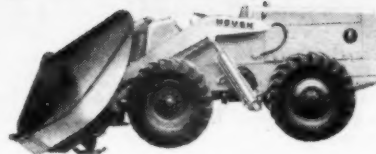
Our factory is modern and tooled for low cost production. We have supplied manufacturers in many different industries for more than 50 years.

Standard or Special, **ELECTRIC Spoke-type** or **Disc Wheels** are built for most types of portable equipment.

Send us your specifications and we will submit our recommendations.



**ELECTRIC WHEEL CO., 2912 Pine, Quincy, Ill.**



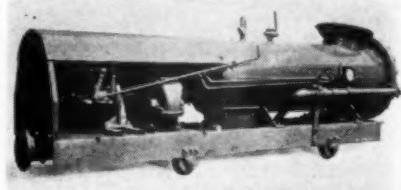
Model HM Payloader with Snow Plow

chine claimed to make it particularly effective for snow plowing are 75 H.P. gasoline or diesel power driving all four wheels; large pneumatic earthmover tires; instant, precise and powerful hydraulic power control of raising and lowering of the plow; four speeds in each direction up to 24 miles per hour; separate, instantaneous forward-reverse shift; power-assisted rear wheel steering for accurate and fast maneuvering; powerful hydraulic brakes; utmost operator visibility; all-weather cab available.

25

### Pneumatic Concrete Placers

Production of pneumatic concrete placers is again under way at Worthington Pump and Machinery Corporation's Construction Equipment Division, Dunellen, N.J., after being suspended during the war years and the years immediately



Worthington-Ransome Pneumatic Concrete Placer

following. The Worthington-Ransome pneumatic concrete placer is designed to place concrete in subways, tunnels, isolated bridge piers, and wherever accessibility makes the ordinary methods impractical or too expensive. The 14 cu. ft. machine requires only 400 cu. ft. of air for 100 ft. shots at the rate of 60 per hour.

26

### Dump Body

A new, low-cost dump body and hoist for pick-up trucks, announced by Woodson Products, Detroit, Mich., can be quickly and easily installed on any make of ½, ¾ or 1-ton trucks. Three important advantages claimed for the vertical hoist used in this unit are: It allows



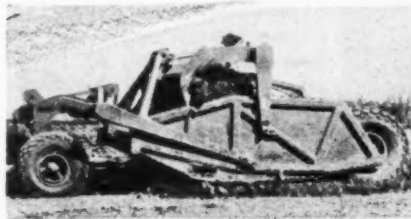
Woodson Dump Body for Pick-up Trucks

easy installation without alteration to the truck chassis or equipment mounted on it. It provides low mounting of the body and also lifts the load at lower hydraulic pressures. The body, which measures 80 in. long by 66 in. wide by 16 in. deep, is welded construction with box-type cross members and longitudinal supporting the floor.

27

## Scrapers

Production is now under way by Gar Wood Industries, Inc., Findley Division, Findlay, O., on the newly improved line of Gar Wood, 4-wheel scrapers for the Allis-Chalmers fleet of in-



dustrial tractors. There are five models ranging in size from the Model 808, 7.6 cu. yd. capacity, to the largest scraper built, Model 528, 28 cu. yd. capacity. Each scraper is fabricated and welded from steel to insure maximum usage and long life. Digging and loading are positive with a heavy duty cutting edge and extension cutting edge. For greater economy the cutting edge and extension cutting edge are reversible and replaceable. Large apron openings insure easy loading and ejecting of the loads. Heavy duty outside apron arms are designed to close and open the apron with minimum loss of power from the control unit. One important feature is the draft point being located aft of the cutting edge which contributes to easier loading. High ground clearance enables Gar Wood scrapers to traverse rough terrain without turning the scraper over or damage to the under structure. All scrapers are operated by  $\frac{1}{2}$  in. cable with straightline cable reeving to insure longer cable life. Positive roll-out ejection is provided by the rear apron moving up and forward in one operation.

28

## Snow Plow Wax

A new liquid snow plow wax, "Snow-Rem", has been announced by Speco, Inc., Cleveland, O. When applied to plow wings and moldboards, this wax produces a hard, slick surface off which snow slides easily. "Snow-Rem" has a high Carnauba wax content and may be applied with an ordinary paint brush

## \$5.22 a ton for Asphalt IS WORTH SAVING!

THE Foote Kinetic Asphalt Mixer will give you 8 to 10 more batches from a barrel of asphalt.

One user\* has reported savings of \$5.22 a ton.

They used to buy their material for \$10.50 a ton.

Now they make it with the Foote Kinetic Asphalt Mixer for \$5.28 a ton. \$5.22 a ton is worth saving! Such savings will soon pay for your Foote Kinetic Mixer.

You cannot compare the Foote Mixer with an ordinary concrete mixer either from the standpoint of construction or the finished product. Let us send you complete details. Ask for Bulletin K-100.

\*Name on request.



- 3 cu. ft. in 30 seconds
- High output for low investment
- Handles any mix
- Fully portable
- New mixing principle gives you 8 to 10 more batches out of every barrel of asphalt

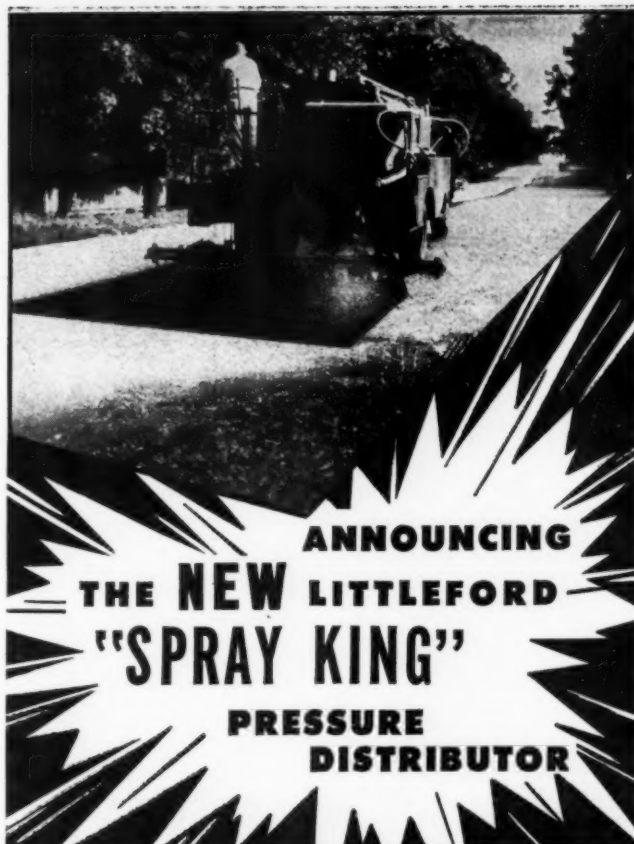
**the FOOTE**  
*Kinetic*  
mixer

**THE FOOTE COMPANY, INC.**

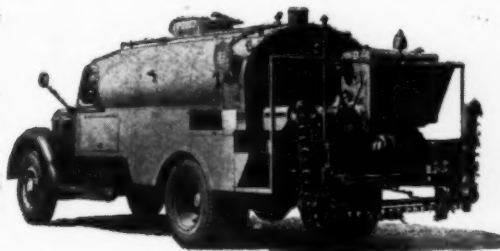
Subsidiary of Blaw-Knox Co.

1936 State Street, Nunda, New York

A BLAW-KNOX PRODUCT



## ANNOUNCING THE NEW LITTLEFORD "SPRAY KING" PRESSURE DISTRIBUTOR



It's here! The new low cost Pressure Distributor—the "Spray King." Once again Littleford is first to offer to Highway Departments and Contractors a low cost unit with features found on most DeLuxe Pressure Distributors.

The "Spray King" has single valve control, a choice of Low Pressure or Torch Type Burners, Full Circulating Vacuum Flow or Standard Suck-Back Spray Bars up to 24 ft. in width. The bars are end-folding or can be non-folding.

Adjustable, manual operated, ground clearance controls for raising and lowering the Spray Bar. Heat Chamber for pump and valves. Filler connection at the rear of the Distributor. These are but a few of the many features of the "Spray King," the new low cost Littleford Pressure Distributor. For further information write for Bulletin Z-14H.



**LITTLEFORD**

LITTLEFORD BROS., INC.

454 E. PEARL ST., CINCINNATI 2, OHIO





## KINNEY Bituminous Distributor

### Known by the work it does!

The Kinney Bituminous Distributor does its job well — it loads fast, spreads bitumen fast and can be depended on to apply exactly the amount per square yard specified by the road engineer. The heart of the distributor — the famous Kinney Rotating Plunger Pump — handles up to 405 GPM, has no valves,

springs or gaskets, and is heated by exhaust for easy, quick starting. Get the facts about the Kinney Distributor — its excellent performance assures added profits and complete satisfaction. Can now be supplied with the Fraco hot spray bar when specified.

Write for Bulletin A48

## KINNEY MANUFACTURING COMPANY

3537 WASHINGTON ST., BOSTON 30, MASS.

New York • Chicago • Cleveland • Philadelphia • Los Angeles

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We also manufacture Vacuum Pumps, Liquid Pumps and Clutches

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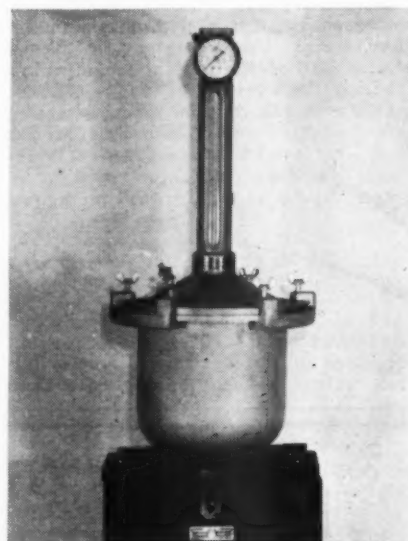
**AT THE  
GATEWAY TO TIMES SQUARE**  
BROADWAY at 63rd ST.—JUST OFF WEST SIDE HIGHWAY  
**OPPOSITE New York's New TELEVISION CITY**

or spray gun. "Snow-Rem" also acts as an effective means of preventing rust. A plow may be placed in service within 20 minutes after application. One gallon of wax covers 250 sq. ft. by brush application or 300 sq. ft. by spray. The manufacturer invites dealer and distributor inquiries.

29

### Entrained Air Indicator

An entrained air indicator for measuring the percentage of air entrained in fresh concrete mixtures has been placed on the market by Central Scientific Co., Chicago, Ill. The sample of concrete is placed in the calibrated bowl and struck off flush with the flange. The cone-shaped cover is clamped to the flange of the bowl, a pressure-tight seal being obtained with a rubber gasket cemented to the cover. The space above the concrete is then filled with water to the zero mark on the graduated, vertical, precision bore, glass tube attached to the



Cenco Entrained Air Indicator

cover. Pressure is applied to the concrete by pumping air into the space over the water column until the pressure gage indicates the pre-determined operating pressure. The air pressure, which is furnished by a small hand pump, is indicated by a precision gage graduated to 0.2 psi with a range of 15 psi. The contraction in volume of the air in the concrete with increase in pressure is indicated by a lowering in level of the water in the graduated glass tube. The scale on this tube indicates the gross air content in percent.

30

### Chain Saw

A new line of one-man gasoline-engine-driven chain saws featuring a complete saw weighing only 33 lb. has been announced by the Homelite Corporation, Port Chester, N. Y. The engine which powers these chain saws is the same Homelite two-cycle air-cooled single-cylinder gasoline engine used on Homelite pumps, generators and blowers. Minimum weight is achieved by using die cast magnesium and aluminum alloys for all major castings in both the engine and saw. Extremely compact design, with cylinder, magneto and drive housing mounting directly on the crankcase, keep the engine to a minimum size and gives the whole saw a smooth finished appearance. Ball and roller bearings are used throughout the engine and saw

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# Quick Help ON PRODUCT INFORMATION

1. For latest information on any product you need in roadbuilding, earth moving, heavy construction, etc., check items on this page, fill out coupon, clip page, and mail. If convenient, use typewriter or print. Or attach to your business letterhead. Give particular type, model, capacity, or other specific data on the blank line below. The blank line can also be used for naming items not listed. Address **ROADS AND STREETS**, Reader Service Department, 22 West Maple Street, Chicago 10, Illinois.

2. If you prefer, instead of mailing coupon, use business-reply card "A" inserted in this publication. Just fill in our code numbers on blank lines, tear out, and mail.

3. See also other inserted cards. Card "B" is for use in obtaining data on any products or literature advertised in this issue of *Road and Streets*.

4. Card "C" is for further information on any items described in the "New Equipment and Materials" or "Manufacturers' Literature" sections—see back part of magazine.

- 16-82 ☐ Acetylene apparatus
- 2-93 ☐ Additives, bit.
- 1-4 ☐ Aggregate plants
- 3-107 ☐ Air entrain. agents
- 16-162 ☐ Air cleaners
- 15-153 ☐ Air accessories
- 15-61 ☐ Air compressors
- 2-94 ☐ Asphalt
- 2-95 ☐ Asphalt emulsion
- 2-96 ☐ Asphalt flux oil
- 16-72 ☐ Augers, earth boring
- 7-161 ☐ Axles, truck
- 16-121 ☐ Back fillers
- 15-62 ☐ Backfill tampers
- 14-152 ☐ Backhoes
- 1-108 ☐ Batchers, Weigh
- 1-90 ☐ Batch meters
- 16-163 ☐ Bearings
- 16-164 ☐ Belting
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- 2-97 ☐ Bit. cold patch mat.
- 2-8 ☐ Bit. distributors
- 2-7 ☐ Bituminous finishers
- 2-10 ☐ Bituminous heaters
- 2-98 ☐ Bituminous mixers
- 2-11 ☐ Bit. plants, central
- 2-12 ☐ Bit. plants, travel
- 2-99 ☐ Bituminous pumps
- 2-100 ☐ Bit. repair outfits
- 2-101 ☐ Bituminous tanks
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- 3-22 ☐ Concrete towers
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- 20-246 ☐ Vibrators, earth
- ☐ Wagons (Dumpwag.)
- 20-247 ☐ Weed burners
- 20-248 ☐ Weed chemicals
- 20-249 ☐ Welding appar., elec.
- 20-250 ☐ Welding appar., oxy.
- 20-251 ☐ Welding rods (see also Hard facing)
- 20-252 ☐ Wellpoint equipment
- 20-253 ☐ Wheels
- 20-254 ☐ Wire
- 20-255 ☐ Wire rope
- 20-256 ☐ Wire rope access.
- 20-257 ☐ Wood preservatives
- 20-258 ☐ Woodworking equip.

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Other products not named above, or specific variety of the products checked

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Name of your company or governmental dept. \_\_\_\_\_  
Type of work for which equipment will be used \_\_\_\_\_

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**"LOW BRIDGE  
AHEAD"**

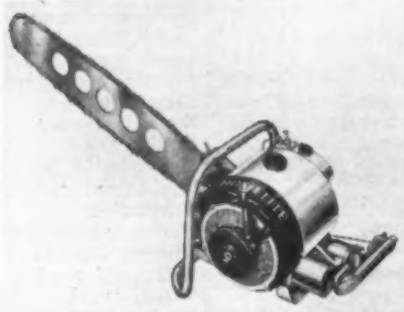


**ROGERS**  
GIRDER TYPE TRAILERS

**EXPERIENCE builds 'em  
PERFORMANCE sells 'em**

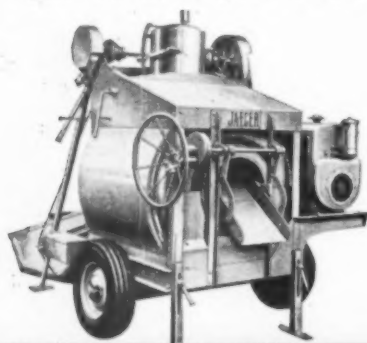
50 Church St., New York 7, N. Y.

to give long trouble-free service. It is claimed the easily sharpened Homelite chrome-plated chain cuts through an 18 in. softwood tree in 18 seconds and through an 18 in. hardwood tree in 35 seconds. This fast cutting speed is stated



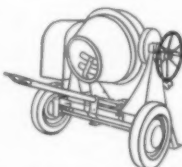
Model 20 Gas Chain Saw

**to cut the cost of  
your concrete work**



**JAEGER BUILDS  
A BETTER MIXER**

Improved mixing blade design, drum rollers on Timken bearings, advanced automotive transmission and drum gear protection—these are some of the features of Jaeger's latest SPEEDLINE mixers. Sizes 6S, 11S, 16S with famous Skip Shaker power loader; 3½S tilters and non-tilt types. Send for Catalog.



**THE JAEGER MACHINE COMPANY**  
Columbus 16, Ohio

*the answer to that problem is this*  
**ROGERS GIRDER TYPE TRAILER**

Rogers builds trailers for unusual needs, embodying characteristic features of fundamental design, but modified



to meet special requirements. With a Rogers Girder Type Trailer there is slight chance of being confronted with a headroom clearance problem. Special construction affords an unusually low bed.

**ROGERS BROTHERS CORPORATION**  
110 ORCHARD ST. ALBION, PA.

Cable Address: "Brosclites"

to be due to a narrower kerf and simple design which causes less drag and removes less wood.

### 31 Small HP Clutches

The Centric Clutch Co., Cranford, N. J., manufacturer of the Rawson centrifugal clutch coupling, which has been used in heavy industry for the last 15 years, has



Small HP Clutch

recently added a line of fractional and small HP clutches. The manufacturer claims an exclusive feature for the new item—adjustability by the user right on the job—for a wide range of capacities and other drive characteristics. The clutch, it is claimed, can be used with motor or engine for capacities from a fraction to low unit HP. This versatility is accomplished by comparatively simple adjustments of the friction segments, called shoes, and of the springs. Besides adjustments for capacity, the pulley type clutches can accommodate several standard sizes of pulleys.

## MANUFACTURERS' LITERATURE

### 32

#### ¾ Yd. Shovel-Crane

An illustrated 16-page catalog No. 2312, on its LS-71, ¾-yd. shovel-crane has been published by Link-Belt Speeder Corporation, Cedar Rapids, Ia. Many photographs and concise text clearly point out features and customer benefits, with the LS-71 illustrated as a shovel, crane, dragline and trench-hoe.

### 33

#### Belt Conveyors

A new 32-page belt conveyor bulletin released by Lippmann Engineering Works, Milwaukee, Wis., presents complete information on stationary, portable and 16 types of special purpose belt conveyors, both troughed and flat belt. Included are future applications and methods of selection of belt conveyors; dimensions, weights and specifications for standard head, tail and intermediate sections; lattice, channel and timber frames; and terminal machinery.

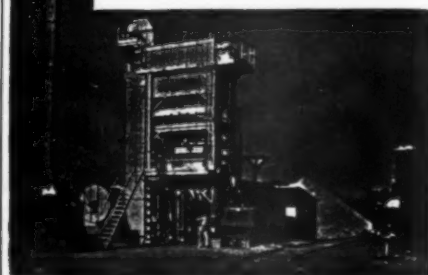
### 34

#### Buckets

A new 28-page catalog issued by The Owen Bucket Co., Cleveland, O., illustrates and describes briefly specific features of construction common to all Owen buckets and grapples. It also makes recommendations to aid in selecting the

## PORTABLE ASPHALT PLANTS

High Production—Low Cost



**THE McCARTER IRON WORKS, INC.**  
NORRISTOWN, PENNA.

## VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.



TOOLS — THE WORLD OVER —  
NOTED FOR QUALITY AND DURABILITY

**VULCAN TOOL MFG. CO.**  
QUINCY, MASS.



proper type of bucket for each service. Ratings, dimensions and weights are given for general purpose buckets, material handling buckets, coal, light and extra light buckets, heavy duty buckets, special buckets and grapples. Owen attachments are illustrated and described.

### 35

#### Abrasive Resistant Rubber

Outlining the recommended uses for its various grades of Armorite, which it describes as the toughest abrasive-resistant rubber known, The B. F. Goodrich Co., Akron, O., has just published a new catalog section on that product. The material is used to line chutes, pipes, sandblast cabinets, launders and other similar applications and is claimed to be 10 to 1 better than steel in resisting the cutting action of many materials. The catalog section describes construction of the several types, gives specifications and data on them.

### 36

#### Heavy Duty Transmissions

The complete line of Fuller heavy-duty unit-mounted, auxiliary and amidship mounted transmissions is described and illustrated in a new catalog issued by Fuller Manufacturing Co., Transmission Division, Kalamazoo 13F, Mich. Designed for use with straight and motor-type trucks engaged in heavy duty transport, or in construction operations—on-the-highway or off-the-highway operations—commercial trucks and trucks engaged in rigging, logging or other operations involving the use of winches, these heavy-duty transmissions provide a wide range of operations with a great degree of flexibility.

### 37

#### 1/2 Yd. Shovel-Crane

A new 16-page illustrated catalog No. 2356 on the Link-Belt Speeder LS-51—1/2-yd. shovel-crane—has been published by the Link-Belt Speeder Corporation, Cedar Rapids, Ia. The Link-Belt Speeder LS-51 is the first 1/2-yd. shovel-crane on the market equipped with full hydraulic controls utilizing the exclusive Speed-o-Matic controls. All welded lower frame, fully convertible for all front end attachment, independent chain crowd, independent boom hoist and many other design features are photographically spotlighted and clearly explained in catalog No. 2356. Also included are charts and drawings showing dimensions, capacities and brief specifications.

### 38

#### Arc Welding Accessories

A new 20-page catalog containing descriptions, specifications, and prices of more than 150 arc-welding accessories is available from the General Electric Co., Schenectady 5, N. Y. Designated as publication GEC-253A, the new bulletin includes information on electrode holders, helmets and goggles, tungsten electrodes, all types of protective aids and clothing, electrode carriers, cable connectors, ground clamps, brushes, cleaning tools, fillet weld gage, and many other accessories for the arc-welding operator.

### 39

#### Bin-Flo Aerator Units

Two new bulletins giving complete information, specifications and prices on their new product Bin-Flo aerator units have been announced by the Bin-Dicator Co., Detroit, Mich. These units provide a simple means of injecting small vol-

umes of low-pressure air into pulverized materials, which tend to pack and do not flow readily from bins, hoppers, and chutes. The unit is a small plate 3 3/4 in. x 7 1/2 in. x 1/2 in. thick which is readily located at points where flow is restricted. Low-pressure air is injected into the material through a special fabric diffuser, causing the material to flow freely. One of the new bulletins gives complete information on the operation and use of Bin-Flo aerator units, including typical layouts, applications, and air supply data. The other bulletin gives complete specifications and prices on the Bin-Flo units.

### 40

#### Compressor

The latest model Schramm 105 uni-stage compressor is illustrated and described in a new bulletin issued by Schramm, Inc., West Chester, Pa. Compressor and engine specifications are included. This compressor is equipped with the Schramm pneustat claimed to effect fuel savings up to 50%. The compressor is operated by the Schramm unipower engine, one important feature of which is that approximately 90% of the engine parts are interchangeable with the compressor.

### 41

#### Mobile Radio Communication

Production of new 25-50 mc mobile radio communications equipment has been announced by General Electric Co. The new equipment is designed specifically for use by such organizations as highway maintenance departments, heavy construction industries, public utilities, law enforcement agencies, the petroleum industry, lumber and forestry organiza-

## THE NEW Grace SPREADER

For working in close quarters

An inexpensive spreader for hot mix asphalt. Works in close quarters. . . . Readily portable for small work such as parking lots, driveways, etc. that would not justify moving in a larger machine. . . .

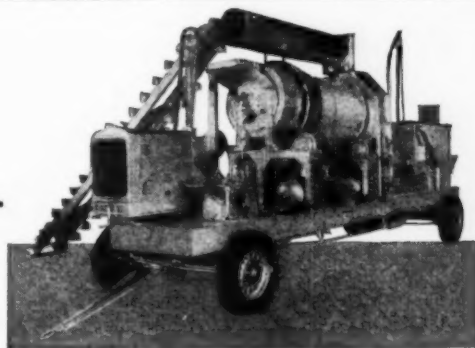


#### 2-WAY AXLE-DRIVEN SWEEPER

Other leading Grace products include: Rapid Fire Circulating Heater, Self propelled pneumatic rollers.

**W. E. GRACE MFG. CO.**  
6001 South Lamar Street • Dallas, Texas

Spreader comes in 7 or 9 foot widths, and can be blocked to produce any lesser width.



## This Portable Asphalt Plant is Suitable for All Paving Maintenance

Almost any type of pavement can be repaired economically and efficiently with a White Portable Asphalt Plant. Asphalt, brick, concrete, macadam, can be easily patched or resurfaced.

It will match any bituminous surface. Produces for immediate hot application or makes mix for deferred cold laying.

Contains internally-fired rotating dryer, pug-mill mixer, bituminous heating kettle, volumetric measurement, air controls. Mounted on pneumatic tires, or furnished for stationary operation. Capacities 4, 8, 12, 25 tons per hour.

Write for Catalog

Elkhart White Mfg. Co. Indiana



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**CUTS COSTS  
IMPROVES  
CONSTRUCTION**

Premolded Para-Plastic Sealing Strips are the answer to tough joint sealing problems when an absolutely watertight seal is required and a hot-poured compound can't be used.

Use Premolded Para-Plastic Strips on vertical and overhead joints and keyways . . . for sealing expansion and contraction joints at the subgrade in highway construction for a perfect seal under all conditions at lowest labor and material cost.

Premolded Para-Plastic Sealing Strips are made for every joint sealing need. Write for illustrated catalog and complete information.



**SERVICISED PRODUCTS CORP.**  
6051 W. 65th ST., CHICAGO 38, ILL.

## Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS  
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.



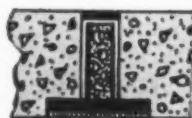
**Shunk**  
**MANUFACTURING COMPANY**  
ESTABLISHED 1854  
BUCYRUS, OHIO



VERTICAL JOINTS



KEYED JOINTS



BASEAL for highway use

tions and others in the land-mobile radio service. The new equipment is available for 20 kc or 40 kc channel widths, the narrow-band units making 40 kc adjacent channel operation a practical possibility in the same service area. The complete line, manufactured at Electronics Park, Syracuse, N.Y., includes a 50-watt and 250-watt station combinations, 30-watt and 50-watt mobile units, remote control consoles, antenna equipment and accessory items.

### 42 Welding Hose

A new catalog section on its lines of welding hose has been published by The B. F. Goodrich Co., Akron, O., and is now available upon request. The section illustrates and gives data on the company's oxy-acetylene and duo-weld hose as well as describing their construction.

### 43 Wagon Drills

A new catalog on Joy wagon drills is now available from the Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Penn. This 12-page book is devoted to the three sizes of wagon drills, light weight, medium weight, and heavy weight made by Joy. One interesting feature is a series of line drawings which show how drilling costs are reduced with these highly mobile wagon mountings. These illustrations indicate initial equipment savings as well as savings in operating costs. The book is well illustrated with photographs of various field applications.

### 44 Hard Facing

A new catalog describing the Colmonoy spraywelder and sprayweld process has been issued by Wall Colmonoy Corporation, Detroit, Mich. This 4-page booklet describes the Colmonoy spraywelder, a powder metallizing gun, and the spraying of powdered Colmonoy No. 6, No. 5, and No. 4 alloys as well as other powdered metals, such as brass, copper, zinc, etc. It is pointed out that the spraywelder can be used for metallizing as well as for the regular Colmonoy Process which combines both welding and metallizing. Several of the hard facing applications which have proven most adaptable to spraywelding are also included. Numerous photographs illustrate the spraywelder, the sprayweld process and a few applications.

### 45 Tractors, Engines, Earth Moving Equipment

The precision manufacturing processes behind "Caterpillar" diesel track-type and wheel-type tractors, engines, and earth-moving equipment are high-lighted in a new 16-page booklet issued by Caterpillar Tractor Co., Peoria, Ill. Photographs taken in the factory cover research activities designed to test and improve Caterpillar products. An illustration of a typical test in the Cold Room where a temperature of 65 degrees below zero can be maintained, plus others showing various laboratory tests, precision inspection methods, foundry casting, welding, machining and heat treatment are all a part of the story. Two full pages are devoted to a description of the manufacturing of "Caterpillar" fuel injection equipment used on all tractors and engines in the company's line.

46

### Field Service Unit

A new bulletin descriptive of its new truck-mounted field service unit, Type PW-308, issued by Davey Compressor Co., Kent, O., describes the unit in detail. It lists many uses in the servicing of construction, military, mining, oil field, agricultural and other machinery operating over large areas and distant from service centers. A floor plan shows the location of welder, generator, compressor, power lubrication equipment and supplementary items.

## WITH THE MANUFACTURERS & DISTRIBUTORS

### Schlenk Joins Thew

Appointment of E. Barrett (Barry) Schlenk as direct factory representative, attached to the company's New York office, has been announced by M. B. Garber, General Sales Manager of The Thew Shovel Co., Lorain, O. Schlenk will handle contacts on export sales and national accounts in the New York area. Schlenk formerly worked in the industrial sales department of The Johnson Wax Co. and got his construction equipment experience as Branch Manager for Roy C. Wayne Supply Co., Kentucky equipment distributor.



E. B. Schlenk

### Smith Joins LeTourneau

Carl D. Smith, who has been with Firestone Tire & Rubber Co., Akron, O. for 26 years, has joined the LeTourneau Co., Peoria, Ill., as special representative of the Sales Division. Currently, Smith will headquarter at Peoria. He has long been closely associated with the heavy machinery industry in the development and use of large rubber tires on high speed earthmoving and construction equipment. He has been working in close collaboration with LeTourneau in providing tires in sizes and load-carrying capacities required for use on LeTourneau equipment.



C. D. Smith

### New Director of Engineering

Frank D. Mason, Jr., has been appointed director of engineering of Fairbanks, Morse & Co., Chicago, Ill. He will continue to be located at the firm's headquarters office, Chicago, Ill. Mr. Mason, who has for several years been Manager of the research division in charge of all research, developments and patents, joined the company in 1922.



## A MOUTHFUL at EVERY BITE

This is not only the claim of OWEN, the name symbolic of the highest grade Excavating and Handling Buckets for years. — Operators everywhere, "on and off" the job, volunteer this testimony.



And — there's a reason. Owen-engineered buckets incorporate special features which have been continually improved.



Branches: NEW YORK PHILADELPHIA

THE OWEN BUCKET CO.  
8095 Breakwater Ave. • Cleveland, Ohio

CHICAGO BERKELEY, CAL.

# and MORE BITES PER DAY

### Jaeger Promotes Yearling

J. H. Yearling, associated for 22 years with The Jaeger Manufacturing Co., Columbus, O., has been appointed general sales manager. Mr. Yearling served in the financial end as credit manager and assistant treasurer before entering the Sales Department where he has been manager of advertising and market research since 1941. As sales manager, much of his time will be spent in the field coordinating the work of the Jaeger sales organization with distributors in 130 cities of the United States and Canada.



J. H. Yearling

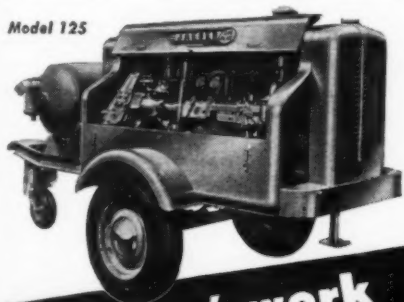
### Koppers Sales Changes

Four appointments to new positions in the sales organization of the Tar Products Division of Koppers Co., Inc., Pittsburgh, Pa., have been announced: S. J. Katz, former assistant manager of the Midwest District, with headquarters in Chicago, has been named assistant manager of the Western Sales District operated jointly by Koppers Tar Products and Chemical Divisions, with offices in San Francisco and Los Angeles. John T. Tierney, Jr., former administrative assistant to the sales manager of the Tar Products Division, will fill the post of assistant manager of the Midwest Sales District for the Division. R. C. Kenan, who has been a member of the Planning and Procurement Department of the Tar Products Division, will replace Mr. Tierney as administrative assistant to the Divisional sales manager. W. R. Black, also a member of the Planning and Procurement Department of the Tar Products Division, has been named assistant manager of the Eastern Sales District of the Division, with headquarters in New York.

### Nordberg Personnel Changes

H. N. Propp has been appointed assistant district manager, Central Territory, Crusher and Process Machinery Divisions of Nordberg Manufacturing Co., Milwaukee, Wis. J. B. Bond is district manager of the Central Territory with offices at the company's Milwaukee plant. Mr. Propp was transferred to Milwaukee from the San Francisco District office where he served as Sales Engineer for the past year. J. W. Crandall was transferred from Milwaukee to the San Francisco District office to serve as sales engineer under T. D. Davis, district manager. J. M. Thistlewaite continues as Nordberg's Crusher Division Special Representative in the Central Territory, with headquarters at Sheridan, Ind.

Model 125



4 days' work  
now done in 3

with  
**JAEGER**  
"new standard"  
compressors



Jaeger Model 125 runs 2 heavy duty or 3 medium breakers at full 90 lbs. pressure, doing 30% to 40% more work than at 70 lbs. pressure from a 105 ft. machine.

Other Jaeger "new standard" sizes, 75, 185, 250, 365, and 600 ft., give you comparable work increases. Cost no more than smaller old sizes. Send for Catalog and prices.

THE JAEGER MACHINE CO.  
Columbus 16, Ohio

### Euclid Distributor Changes

The Euclid Road Machinery Company, Cleveland 17, Ohio, announces the following changes made recently in the Euclid distributor organization:

Euclid-Kentucky, Inc., 3900 Crittenden Drive, Louisville, Ky., has taken over the Euclid distributorship for Kentucky, replacing Brandeis Machinery & Supply Co., Inc.

Reid-Holcomb Company, 1815 Kentucky Ave., Indianapolis, is being assigned southern Indiana territory formerly served by Brandeis.

Euclid Sales & Service, Inc., 5231 Manchester Ave., St. Louis 10, Mo., take over southern Illinois counties formerly covered by Brandeis.

Clark-Wilcox Company, 118 Western Ave., Boston 34, Mass., have been assigned the following territory:

The state of Maine and parts of New Hampshire formerly assigned to Eastern Tractor & Equipment Co., plus the state of Vermont. This is in addition to their present coverage of Rhode Island, counties east of and including Worcester in Massachusetts and several counties in New Hampshire.

### New Acrow Distributor

Lauren Burt, Inc., 3254 Walnut St., Denver, Colo., has been appointed distributor for products of Acrow, Inc., New York City, in the states of Colorado and Wyoming.

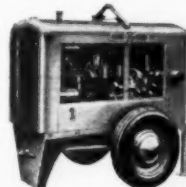
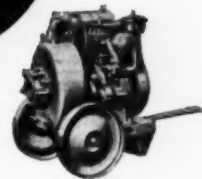


New 2" aluminum  
pump weighs 105 lbs.,  
pumps 9000 gph ...  
Gives high head  
performance for price  
of low head pump.



**JAEGER  
PUMPS**  
make wet jobs  
dry

Extra power and double  
priming action to do  
water faster. Built to  
outlast cheaper pumps  
by thousands of hours.



Heavy duty 2" to 10"  
models for low or high  
head requirements.  
Super-Jet pumps for  
pressures to 275 lbs.  
Diaphragm and caisson  
pumps. Get catalog.

THE JAEGER MACHINE COMPANY  
Columbus 16, Ohio



## MANITOWOC SPEEDCRANES

BRAND NEW—just received from the factory; 25 to 50 tons lifting capacity; clamshell and dragline attachments; long booms; available immediate shipment; for RENT or SALE.

### CONTRACTORS MACHINERY CO.

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Choker, Bridle and Basket Slings  
Wire Rope Distributors for  
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#### LOWERY BROTHERS

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- 1 #12 Caterpillar motor grader 9K1100, good condition.....\$7,000
- 1 D8 Caterpillar Tractor with PCU 1H2873, good condition.....\$6,500
- 1 D8 Caterpillar Tractor 2U2950 with Cat. PCU, Dozer and Le Tourneau scraper. Very good condition and about 2000 hrs.....\$14,000

LEWIS SHAW

Decatur, Ill.

Phones 26213-27172

### FOR SALE

- 1—No. 56 Pioneer portable crushing plant powered by two D17000 Caterpillar Diesels equipped with 30-inch x 42-inch primary crusher, 24-inch x 54-inch roll crusher and with 40-inch x 12-foot traveling grizzly.

- 3—Koehring Dumpsters Serial Numbers D-2577, D-2578 and D-2579.

ALL IN EXCELLENT CONDITION  
NOW AVAILABLE

#### Kearney, Crume & Company

3606 Commercial St., Dallas, Texas  
Phone Tennessee 3-3783

### FOR SALE

- 1—Complete Pioneer washing and screening gravel plant, Model 305W.

- 1—"Caterpillar" D-4 with 1 yard Traxcavator.

- 1—"Caterpillar" 70 tractor with 12 yard scraper.

#### R. M. Checkley Construction Co.

R.R. 1 Edwardsburg, Michigan

Phone: 68-F-12

### FOR SALE

- 3 "Caterpillar" DW-10 Tractors, complete with LaPlant-Choate CW-10 Hydraulic 8 1/2-10 Cu. Yd. Scrapers. Reconditioned. Exceptionally good condition and appearance. Bargain price.

- 1 Allis-Chalmers HD-7 Wide Gauge Tractor, equipped with Baker Hydraulic Dozer. Used 1760 hours. Appearance and condition like new. Price \$6,000.00.

#### MARTIN-ROASA TRACTOR & EQUIPMENT CO.

3117 First Av., S.E. Cedar Rapids, Ia.

### SPACE HEATERS

War Surplus Bargain

New—Ready To Use!  
40,000 BTU capacity

- Burning gasoline, kerosene or diesel fuel.

- Electric blower—12 V. DC or 110 V. AC using small transformer.

#### Portable, Quick, Clean Heat

Ideal for curing room, concrete plants, work under construction, emergency heat, or auxiliary heaters.

\$95.00 each

#### Clapp, Riley and Hall Co.

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### FOR SALE

- 1—American pulverizer with 125 HP motor
- 1—70 HP Marine type diesel engine
- All steel dredge boats, tug boats and pug boat
- Electric motors AC from 1 HP to 300 HP
- Link Belt pan conveyors 36" x 22" centers
- Richardson automatic scales
- 4" and 5" cement circulation pipe
- Steel bins, hoppers and tanks
- Fuller-Kinyon pump (6")
- 6' x 50' Manitowac dryer
- 1 10' x 150' Kiln
- 4 Wood hoppers lined with steel
- Elevators with casing and double chain
- B & W coal pulverizer
- Steel buildings: 20' x 100', 75' x 350' and 50' x 350'
- Fuller clinker cooling equipment for 10' kiln
- Schmidt tube mill 6'6" x 20'
- 1—Single drum deck hoist
- 1—Bell & Howell 16 mm. Movie projector

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P. O. BOX 688

QUINCY, MICHIGAN

### FOR SALE

- 1 completely overhauled from top to bottom TL20 Lorain crawler, equipped with backhoe shovel front, 60 ft. boom, fair lead and Page dragline bucket. This machine and attachments are practically new and will be sold for \$9,750.

- 1 RD7 Caterpillar tractor with double drum LeTourneau power unit and bulldozer. This machine has new idlers, sprockets, rollers and rails which are two months old. Starting motor, diesel motor, final drive and power unit completely overhauled in March, 1949. In very good condition for \$5,750.

#### ANDY TSCHIDA

Phones: HUmboldt 1642,  
HUmboldt 4681

St. Paul, Minn.

### FOR SALE

- 1 Rex 16-S Mixer, Serial HB-382, mounted on 4 Pneumatic Tired Wheels, powered with Wisconsin 4 cyl. engine, Model VF4, Serial 1021797.
- 2 Rex 2" 10M Pumps, Serial BT1570 and BT1587, mounted on 2 Pneumatic Tired Wheels, powered with Wisconsin 1 cyl. AE engines.
- 1 Durex No. 5 Saw Rig, Serial S-927, powered with VE4 Wisconsin Gasoline Engine, Serial 1032316.
- 1 Rex 10-S Mixer, Serial K9489, mounted on 4 Steel Wheels, powered with LeRoi Engine, Serial 87995.
- 3,000 sq. ft. Armco Black Steel Interlocking Sheeting.
- 1 Winslow Type G Wheelbarrow Scale.
- 1 Gar-Bro 1 cu. yd. Concrete Bucket, Type No. 433, Serial 5733.
- 2 Gar-Bro Concrete Buggies mounted on Pneumatic Tired Wheels.
- 1 Model 23B Gasoline Concrete Vibrator, powered with 3 h.p. Gas Motor.
- 1 Chrysler 4" Pump, Serial 11799, mounted on a 2 Pneumatic Tired John Deere Wagon, Serial 1652 and powered with Chrysler Engine, Serial 104-7936.
- Pneumatic Tired Concrete Wheelbarrows.

#### WM. H. GILLILAND

Route No. 2, Alpena, Michigan

### FOR SALE

Model B3 Link-Belt Speeder 1 1/2-yard combination shovel, dragline and clamshell, complete with 4-cyl. Hercules gas engine, 1/2-yard dragline bucket. Good working order. \$2800.00, F.O.B. Grand Forks, N.D.

#### ROBERT J. WYLIE CO.

612 Pioneer Bldg. St. Paul 1, Minnesota

### FOR SALE

Model 44B Barber-Greene Ditcher, running condition, \$800.00.  
HD-6 Bulldozer with Balderson blade, overhauled and in very good shape including belt pulley, \$3,200.00.

#### A. S. KINSINGER

ROUTE 1 GORDONVILLE, PA.

FOR SALE: 1 new or 1 two year old Barber-Greene Asphalt Spreader with extensions.

Box 934 Sioux City, Iowa



## FOR SALE

- 1—N. W. Shovel, 2 1/2 c.y., new Oct. 1946
- 1—N. W. Shovel, 1 1/2 c.y., new April 1946
- 1—P & H Dragline, 1 1/2 c.y., new June 1948
- 1—N. W. Shovel, 3/4 c.y., Diesel, Backhoe—40' Crane, Dragline, new Aug. 1948
- 1—Allis Chalmers Tractor Model HD19H, new May 1948
- 5—D W 10's—used 2500 hours
- 1—Caterpillar Auto Patrol #12—9K4626
- 1—Caterpillar D8 Angledozer #8R8933
- 1—Caterpillar D7 Bulldozer 4T5988

**Williams Construction Co.**  
Box 145, Middle River, Baltimore 20, Md.  
Phone: Essex 1310

## READY MIXED CONCRETE PLANT

1—Complete READY MIXED CONCRETE PLANT—Blaw Knox. Including the following: 800 barrel bulk cement bin, 100 ton per hour bucket elevator with unloading screw for handling bulk cement; Model 84-S Ransome Mixer (less than 2 years old); 100 ton three compartment aggregate bin complete with cement and aggregate weighing batchers; electric powered gantry and whirley for charging bins, with 2 cu. yd. Clamshell Bucket. Plant in daily operation and can be inspected in the Philadelphia district. Available on or before September 1, 1949. Offered subject to prior sale or commitment.

**FURNIVAL MACHINERY CO.**  
54th & Lancaster Ave., Phila. 31, Pa.

## FOR SALE

- 1—Koehring 304—3/4 yd. shovel—40' crane boom—clam and drag attachments—used seven months—excellent condition.
- 1—Koehring Dumpsters—WD-60 Diesel power; W-55 Gas power. Both rebuilt.
- 1—Koehring 34E, twinbatch Paver, in process of complete rebuilding—Gas power.
- 1—Marion, model 93-M—new 1947—used 10 months, one shift operation—standard 2 1/2 yd. shovel attachment—Cat. 17000 engine—lights—Good as new.

**CAPITOL EQUIPMENT CO., INC.**  
P. O. Box 5, Hill Station, Harrisburg, Penna.  
Phone—4-3148

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**HEADQUARTERS for REPAIRS—any make**

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS-107, of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

## WARREN-KNIGHT CO.

Mfgs. of Sterling Transits & Levels  
136 N. 12th St. • Philadelphia, Pa.

## FOR SALE—BARGAIN

Asphalt Batch Plant, 16 cu. ft. Kwik-Mix Asphalt Mixer complete with gasoline air cooled engine, 16' ladder extension mounted on pneumatic tires.

Loader Scoopmobile 3/4 cu. yd. mounted on pneumatic tires.

Timbers and planking to erect hoppers. Equipment in excellent condition.

All for \$6000.00 F.O.B. Washington, D.C.

## O. A. SHEPHERD

815 Newton St. N.E., Washington 17, D.C.  
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Every part for every type military vehicles. One of the most complete stocks in America.

Front axles, complete; front axle shafts, rear axle shafts, axle housing, differential assemblies, transmission assemblies, rear end assemblies, drive shafts, universal joints, pillow blocks, ring gears and pinions, oil seals and retainers, radiators, radiator hose, brake lining, hubs and drums, transfer cases, complete, transfer case seals, transfer case parts, all motor parts, cylinder heads, pistons, pins, rings, crankshafts, bearings, overhaul gasket sets, oil filters, cartridges, starters, generators, fuel pumps, voltage regulator, carburetors, fan belts, wheels, clutch pressure plate assemblies, clutch plates, front and rear springs, steering assemblies.

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## WILENSKY

**AUTO PARTS CO.**  
1226-28 Washington Ave. N  
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## FOR SALE

NEW Allis-Chalmers HD5 with Tracto shovel front end loader. Priced to sell.

K. R. HAYS

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## FOR SALE

One Caterpillar Elevating Grader. Late model. Good condition. Six cylinder diesel motor. 48" machine. Price \$4500.00.

BILL CURPHY CO.

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## FOR SALE

## SURPLUS EQUIPMENT

- 10 Allis Chalmers, HD10 tractors, like new.
- 5 Buckeye Shovel cranes, Model 70.
- 5 P & H model 255A and 155A.
- 1 MC4 Lorain truck crane.
- 1 MC3 Lorain truck crane.
- 3 D7 Cat. dozers.
- 3 Case rubber tire farm tractors.
- 3 Lima paymaster, 3/4-yard combination shovel and crane.

For prices, etc., please write to

## FRANK TESTA

925 Citizens Bldg., Cleveland 14, Ohio  
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## FOR SALE

1—KR11 Int'l. truck and 3 yard Rex Mixer. Engine rebuilt, repainted—\$3500.00.

6—KR11 trucks for Mixers, 1944-1948. Price \$2000.00-\$4000.00.

3—Int'l. 2000 gallon, 3 axle water or oil tankers—\$1000.00 each.

1—LowBoy trailer, 8-8.25x15 tires, practically new, \$2500.00.

## BERMAN SALES CO.

R.D. #1, PENNSBURG, PA.  
PHONE PENNSBURG 521

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GYRATORY: 30" Super. McCully; 30" Allis-Chalmers; also Nos. 12, 10, 8, 7 1/2, 6, 5, & 4. JAW TYPE: 24x36, 25x40, 22x50, 30x42, 42x48, and smaller sizes down to 7"x9".

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ROLLS: Allis-Chalmers 72x30, 54x24, 54x20, 40x15 & 18x10. Pioneer 18x30. Universal 16x24. New Holland 24x16 & 18x10; McLanahan 30"x60", 18x24 & 18x30 Single Roll. Also others.

HAMMERMILLS: Williams Nos. 2, 3, 4, & 6; Day No. 40 & No. 70; Gruendler 2XB & 3XB; Dixie 2024 & 3650.

MILLS: Hardinge 3'x8", 6'x22", 6'x3', 8'x3' & 8'x4'; Kennedy 4x8, 3x5, 5x11; Marcy 4x5, 6x4; Smith 16B Tube Mills; Raymond 4 & 5 Roller Mills; Bonnot, Fuller, Sturtevant & others.

CRUSHING PLANTS: 25x40 Cedar Rapids Portable, Diesel Power. Others portable & stationary.

BINS & BATCHERS: 70 & 150 yd., 3-comp., Etc.

TRUCKS: Euclid, FWD, International, Etc.

SHOVELS: 80-D Northwest 2 1/2 yd. combination Link Belt Speeder K-580, 3 yd., and others.

DRAGLINES: 6 Yd. Walker, 145' boom, Diesel Lorain Model 40-A Crane-Drasline, Diesel.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cables, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kiln, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

MARIETTA ALEX T. McLEOD KANSAS

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Euclid Loader Model BV5, 7 Terra-Cobra Scrapers.

4—Tournapulls, Euclid Trucks, Tournawagons.

Gas, Diesel, Steam Loco. Dump Cars, Loco. Cranes.

Rotary Kilns, Dryers, 10'x90', 10'x170', others.

Red Mills—Gyratory Crushers, Roll Crushers, Jaw

Crushers 10"x36", 15"x36", 18"x36", 20"x36", 24"x36", 36"x42", 42"x60", some portable, some with

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Pumps, Tuggers, Mine Hoists, Motors, Transformers,

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PORTABLE LOCOMOTIVE FIRE BOX

75 to 110 HP 150# ASME Code. New tubes and equipped with steam automizing oil burners.

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ADNUN ASPHALT SPREADER

Used—Good Condition

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Steam Pile Hammers and Extractors  
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- 9—New surplus Cleveland 102-A rotary air drills Ea. \$50.  
1—Ross 19-HT fork lift 3-ton cap. \$3250.  
1—Link-BELT Indust. crane, solids, 6-ton cap., 12'-20' boom \$2950.  
1—TRACKSON swing crane on IHC T-9 \$4500.

**ROAD BUILDERS EQUIPMENT CO.**  
McMillan & Iowa Sts., Cincinnati 6, Ohio

1918

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## CONSTRUCTION EQUIPMENT

New and Used

**SALES—RENTALS—SERVICE**  
**ALL EQUIPMENT & TOOLS**  
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Ingersoll-Rand Air Compressors, Tools  
Portable Air Compressors and Tool Rentals  
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Rex Chain Belt Truck Mixers, Pumps and  
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## SPECIAL OFFERING --

**STORAGE TANKS—TANK CAR TANKS**  
—USED—reconditioned—8000-10000—  
12000 gallons, coiled or non-coiled.

**STORAGE TANKS—NEW—welded—Underwriters Labeled—HORIZONTAL or VERTICAL—550 to 30000 gallons—prompt shipment.**

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**PRESSURE TANKS—NEW—575 gallons 42" x 108"—welded—85# W. P.**

**GALVANIZED SHELLS—USED—30"—36" 42" diam. suitable for culverts—storage bins.**

**STEEL BINS—NEW—5' diam. 12' high—6' diam. 19' high—1/4" steel.**

**GLASS LINED INSULATED TANKS—USED—with agitator and motor—3000 gallons—suitable for food products.**

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General 3/4 yard Dragline Crane, Complete with Bucket.....\$2,850.00  
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Used Clam & Dragline Buckets.....200.00 & Up  
Model "L" Bulldozer.....1,500.00  
Model "55" Caterpillar Bulldozer.....2,250.00  
T-6 Bulldozer, Good Condition.....2,450.00  
Carroll Trailer, 25 Ton Capacity, Tandem Axles.....1,250.00  
Fruehauf Bulldozer Trailer.....650.00  
Dump Body, 8 yard Capacity, 12 ft. Long.....275.00

**VOS EQUIPMENT CO.**

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1—New BUDA Earth Drill, Model HBJ, Powered with Gasoline Engine, including electric starter. Automotive type transmission provides 4 speeds forward, one in reverse. Hydraulically controlled. Tower lowers to horizontal traveling position.

**FURNIVAL MACHINERY CO.**

54th & Lancaster Ave., Phila. 31, Pa.

## FOR SALE

**AT A RIGHT PRICE:**

- 1—Sterling Diesel Tandem Tractor with a new H.B. 600 Cummings Motor. Tractor completely rebuilt two months ago by Sterling Motors.  
1—90 Ton Rogers "I" Beam Trailer.  
1—D3 1947 Ward La France Standard Tractor.  
1—25 Ton 1947 Lilly Low-Boy Trailer with eight 825-15 tires.  
1—D3 1947 Ward La France Tractor with 5 Speed Main Transmission, 3 Speed Auxiliary, Low Speed Timken rear end. 1200x20 tires.  
1—1947 Fruehauf 50 Ton Low-Boy Drop Deck Trailer with 16-750x18 tires.  
1—Rogers Low-Boy with 80 Ton Drop Deck. 750x18 tires.  
1—Dorsey High-Trailer, Flat Deck, 35 feet long using 1100x24 tires.  
1—25 ft. Fruehauf High Trailer, flat deck with 1100x24 tires.

## WANTED:

1—Model 32 Hanson Shovel Front.  
Write:

**T. J. Kilmain Sales Co.**  
North Mt. Vernon Ave.,  
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## RUGGED HAULING JOB???

Did you say your transportation was impossible, too costly or just plain tough?

Before you throw up your hands call U.S.A.C. headquarters and let us check it over with you. If we don't handle it to your entire satisfaction, the best box of cigars in the house is on

**U.S.A.C. TRANSPORT, INC.**  
Dover, Delaware Phone 5791

## GRADERS

3—ROME GRADERS, Model 404, Tandem Drive, New in February 1947. Hydraulic Control, powered with a 104 Brake H.P. 6 Cylinder Diesel Engine Power 4 Wheel Brakes, Scarifier included. Serial Nos. 404-791, 404-788, 404-790.

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WE OPERATE THE FOLLOWING ARMY TRUCKS

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.....Studebaker or Reo 2 1/2 ton 6x4 or 6x6  
.....International M-5H-6 2 1/2 ton 6x6  
.....Other Trucks



## FOR SALE

- 1 Late 1947 Model #512 Adams Motor Grader—complete with UD-14 International Diesel motor, fully enclosed steel cab, scarifier, Vee plow, and snow wing. This machine completely rebuilt, painted, and will go out of our shop with a new guarantee. Price—\$7,500.00.
- 1 Practically brand-new 1949 Austin-Western 90-H Motor Grader, complete with scarifier, fully enclosed all steel cab, heater, defroster, windshield wipers and bulldozer attachment. Price—\$10,500.00. New guarantee.
- 1 1944 TD-14 International Tractor with Heil Road-builder Angle Doser—thoroughly rebuilt from top to bottom. Equipped with radiator guard, head lights, tail lights, new rolls, idlers, take-ups, locks and runs like new. Price—\$5,500.00.
- 1 Heavy duty Four Wheel Drive FWD Dump Truck—rebuilt with brand new Waukesha motor and new heavy duty snow plow frame—complete with Vee Plow or one-way. Price—\$3,000.00.
- 1 Model HS Four Wheel Drive FWD Truck, complete with new snow plow frame and one-way snow plow completely rebuilt, new tires. Price—\$2,500.00.
- 1 Tandem drive Warco Motor Grader—complete with scarifier—rubber excellent—latest model with center control operator's platform. Completely checked and painted. Price—\$950.00.
- 1 New 1948 Austin Western Badger 1/2 yard Shovel. Complete with International Diesel motor, self starter, enclosed cab, complete as a shovel and trench hoe attachment. This machine can be demonstrated at our yard in West Hartford, Conn. Takes a brand new guarantee and we will sell same with both attachments for quick sale for—\$11,000.00.
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**R. W. BLEILER EQUIPMENT CO., INC.**  
579 New Park Avenue Ph. 3-4273  
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## RELIANCE CRUSHING PLANT

- 15" x 30" Crusher—38" Bucket Elevator
- 50" x 17" Roller Screen—100 Ton Capacity Bin
- 2 Gaso. Engine Power Units
- 8" x 16" Jaw Type Crusher—25 hp. 440 V. 3 ph. 60 cy.

## HOIST

- Double Drum Skagit Gaso. Hoist, Model BU-140 Capacity 49000# @ 57 F.P.M.
- 533# @ 12 F.P.M.
- 3 Drum Steam Skeleton Hoist and Attached Swinger Several 30 hp. Double Drum Lidgerwood Gasoline Hoists
- 3 Drum Electric Hoist—125 hp. 220/440 vt. 3 ph. 60 cy; 11500# @ 300 F.P.M.—with attached Swinger.

## NEW WIRE ROPE BLOCKS

- 18" Single 20 Ton with S. Shackle.....\$25.00
- 18" 3-Sheave 30 Ton with Shackle.....50.00
- 18" 4-Sheave 30 Ton with Shackle.....75.00
- #32 Drop Forge Hooks, New.....3.00

## 27E RANSOME PAVER

full caterpillars with boom and bucket  
Concrete Mixers of all sizes.

## DERRICKS

- 1—Lambert Steel Guy Derrick, mast 115'; boom 100' with 20" Steel Bull Wheel, Capacity: 10 Ton Flat Boom, 20-Ton 50' Radius.
- New #36-9500 Simpler Double Leverage Pipe Push & Pull Jacks with 3/4" to 4" Jaws & Pilots.

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Model 180 Single Pumcrete with remixer—1000' of pipe and fittings  
Koehring Finisher 18' to 26'.  
Several Steel Concrete Towers, Buckets and Hoppers.  
1 yard cap.  
Gasoline Engines of all types.

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300 Amp. Wilson Hornet Electric Motor Driven Welders

## COMPRESSORS

- 210 cu. ft.—Two-stage Gardner Denver
- 315 cu. ft.—Two-stage Chicago Pneumatic, Gasoline
- 315 cu. ft.—Three-stage Worthington, Gasoline.

## HOT AIR HEATERS

Hermon-Nelson—250,000 BTU per hr.

## GASOLINE PUMPS

1 1/2" to 6"—Self-priming centrifugal  
3-6" x 4" Carter cent. fuel oil pumps.

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## DEPENDABLE USED MACHINES

Browning 20 ton erectors crane  
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Pioneer 42x14 apron feeder

**TRACTOR & EQUIPMENT CO.**  
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## Machinery for Sale

### IMMEDIATELY AVAILABLE

- 1—2 drum American Hoist, no power.
- 1—1/2 yd. Koehring 205 gas combination shovel and dragline.
- 1—1/2 yd. Speeder shovel, "Cat" diesel power.
- 1—3/4 yd. Lima Paymaster gas shovel.
- 1—3/4 yd. Bucyrus-Erie 20-B combination shovel-dragline, "Cat" diesel power.
- 1—7' Grace road boom.
- 1—A-600 Cummins diesel engine, 75 H. P.
- 1—3'x8' Overstrom double deck vibrating screen.
- 1—24'x75' steel frame belt conveyor.
- 1—14" bucket elevator, 22' center.
- 1—100 KVA 900 RPM 220/440 volt AC generator.
- 1—100 H. P. 3-drum Mundy gas hoist, on sled.
- 1—2 yd. rehandling clamshell bucket.
- 4—Jaw crushers, 24x36, 15x38, 10x24, 10x20.
- 1—27"x14" Classifier.
- 1—7-ton Plymouth standard gauge gas locomotive.
- 1—Hough diesel Payloader.
- Stephen-Adamson material handling equipment.

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## WASHINGTON MACHINERY & STORAGE CO.

7329 E. Marginal Way Rainier 1123  
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Representing  
STEPHENS-ADAMSON MFG. CO.

## IN STOCK FOR IMMEDIATE SALE

- 1—New Unit 1/2 cu. yd. trencher attachment.
- 1—New Unit 3/4 cu. yd. shovel attachment.
- 1—New Unit 1/2 cu. yd. 30 ft. dragline attachment.
- 1—Completely new styled Unit fairlead.
- 1—Used 1947 Unit model 514 trencher with new GMC diesel motor.
- 1—Used 1947 Unit model 357 rubber-tired crane.
- 1—Used 1939 Unit 3/4 cu. yd., 3/4 swing, crawler shovel, with chain crowd and 6 cyl. Waukesha motor.
- 1—Used 1/2 yd. PMCO dragline bucket.
- 1—Used 3/4 yd. Hendrix dragline bucket.
- 1—Used 24 in. x 40 ft. conveyor equipped with Wisconsin engine, 3 cu. yd. hopper end grizzly, mounted on dual wheels, very good condition.

## J. W. RALPH EQUIPMENT CO.

542 No. Prior Ave. St. Paul, Minn.  
NEstor 7367

## PUMPCRETES

1—REX PUMPCRETE, Model 160 Double, Completely Overhauled. Gasoline Engine Driven, Latest Model Machine with Selective Drive Transmission, with approximately 1,000 lin. ft. 7" Pipe.

1—REX PUMPCRETE, Model 160 Single, Gasoline Engine Driven, Very Latest Model, Completely Overhauled with approximately 700 lin. ft. 6" Pipe.

**FURNIVAL MACHINERY CO.**  
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Used—Wide—Conveyor Belt. Condition Secondary. To be used for truck flaps.

**Zidell Machinery & Supply Co.**  
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- 1—Barnes road pump.....\$ 300.00
- 2—LeTourneau 15 yd. pan, tires 18" x 24".....\$ 3,500.00
- 3—112 Adams Road Grader, late model pneumatic tires. Rear 1300 x 24. Front 700 x 24.....\$ 4,000.00
- 4—Jaeger Air Compressor on Pneumatic Tires. 105 cu. ft. with three hammers, hose and other attachments.....\$ 2,000.00
- 5—Ten Ten 3 wheel Hercules Roller, 6 cylinder motor. Electric starter.....\$ 2,000.00
- 6—Heavy duty Osgood Combination Crane & Shovel Equipped with 45' boom, 1 yd. Blaw Knox bucket also equipped with shovel front and dipper stick. Has new 90 hp. G.M. diesel motor.....\$10,000.00
- 7—No. 66 Pull Grader (Caterpillar) 12' blade leaning wheels.....\$ 600.00
- 8—Lot of Blaw Knox combination curb and gutter forms also 1,000 feet of 5" sidewalk forms, (the lot).....\$ 1,000.00
- 9—Garwood 15 yd. Pan. Purchased new March 1948.....\$ 4,500.00
- 10—45' Lattice Boom.....\$ 500.00
- 11—Three Bag Ransome Mixer on four pneumatic tires with three pneumatic tired wheelbarrows, also equipped with scales and 3 pneumatic tired concrete carts.....\$ 1,500.00

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## BARGAINS!

- Caterpillar D4400 Power Unit 53 H.P.—Like new.
  - McLanahan-Stone 18" x 36" Crusher—New Roll.
  - Acker Core Drill—Hydraulic Feed—all tools.
  - Con-Sol water well driller.
  - 1947 Dodge Power Wagon—Water tank.
  - 300 Amp Hobart Welder
  - Galion 101 Grader
  - 2 1/2 yd. Dipper 1201 Lima.
  - 3/4 yd. Dipper Lima Paymaster.
  - Crankshaft and Crank Case Cummins Model L engine.
  - Sticks, Lima 802, new racking.
  - 4 White WA22 Dump Trucks
  - 2 G.M.C. 503 Model Dump Trucks
  - 2 Truck beds—8 ton coal
- Rimersburg Coal Company**  
Rimersburg, Pa.

## FOR SALE

- 1—Plant—Cedar Rapids, 25 x 40 Crusher, Power Unit, Conveyor, Screen and Bins
- 1—25 x 36 Jaw Crusher, TelSmith, 75 H.P. Motor
- 1—36 Gyrasephre Crusher, 50 H.P. Motor
- 1—5' x 10' Tyrock Screen
- 2—Conveyors
- 2—40" TelSmith Gyratory Crushers
- 1—18" Intercone, TelSmith
- 1—#6 Champion Jaw Crusher
- 1—8" x 6" Goulds Centrifugal Pump
- 2—8" x 5" Goulds Centrifugal Pumps
- 1—1/4 yd. Lorain Shovel & Crane
- 1—1/4 yd. P & H Shovel
- 1—1/4 yd. Michigan Shovel on rubber
- 1—1/2 yd. Northwest Shovel

**BLUE BALL MACHINE WORKS**  
Blue Ball, Pennsylvania

## SHOVELS - DRAGLINES

- NORTHWEST Model 25 Shovel, Int. Diesel Engine. Serviceable as new.
- LORAIN Model 82 Shovel, D-13000 Power Excellent condition
- P & H Model 810 Dragline, 80 ft. boom. 4 yard Hendrix Bucket, Atlas Engine. Excellent Condition.
- P & H Model 775 Dragline, 77 ft. boom. Atlas Engine, 3 yard bucket. Rebuilt condition.

EXCEPTIONAL PRICES FOR QUICK SALE

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## Bargains in used CONSTRUCTION EQUIPMENT

"CATERPILLAR" RD6 TRACTOR, Diesel, Ser. #2H1177, equipped w/LaPlant-Choate hydraulic straight dozer & Hyster winch. An old tractor but in good running condition. Price...\$1,950.00

"CATERPILLAR" D8 TRACTOR, Ser. #1H6072 equipped w/LaTouneau 12' bulldozer & LaTouneau PCU. This tractor is in good operating condition & we consider it a bargain at this price, f.o.b. Evansville, Ind. Price...\$7,350.00

"CATERPILLAR" 15 TRACTOR, Ser. #PV-1695, 22.77 drawbar H.P. Tractor runs & operates in a satisfactory manner. Price f.o.b. Evansville, Ind. \$700.00

SCRAPER, "CATERPILLAR" Model 70. Nearly brand new & now on our display floor w/other new equipment. Oversize tires. List price \$7,200.00. Our price...\$6,495.00

ENGINE POWER UNIT, "CATERPILLAR", Diesel D4600. Brand new. Excellent arrangement except that it has no hood or dash. Equipped w/closed clutch, steel base, suction fan, fuel tank, radiator & gasoline starting eng. Current selling price for this eng. is \$3,400.50. Our price for this unit...\$2,985.00

TRACTOR & DOZER, "CATERPILLAR" D4, Ser. #2T5749, equipped w/LaPlant-Choate hyd. angle dozer & Hyster D4 towing winch. Engine completely rebuilt. New blade. Price...\$4,650.00  
Write—F. L. Bennett Louisville, Kentucky

## Roy C. WHAYNE SUPPLY COMPANY

EVANSVILLE, IND. LOUISVILLE, KY. PADUCAH, KY.

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200—Crawler cranes. Any size, any make.

500—Crawler tractors, any size and make.

Also trench machines, scrapers, truck cranes, rollers.

Some of this equipment has never been used.

Priced to sell at a real bargain. Yard in Chicago. Main yard in California.

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## PRICED TO SELL Used Crawler Tractors

1—International TD-9 with Bucyrus-Erie Dozershoevel  
2—International TD-14's one with Heli Cable Dozer one with Isaacson Hyd. Angledozer

1—International TD-9  
1—International TD-9 with Hughs-Keenan Leader  
1—International T-40  
1—Allis-Chalmers Model K with Baker Hydraulic Dozer

Used Wheel Tractor  
1—International ID-9 with Ottawa Leader & Trojan Dozer  
Motor Patrol, New  
American No. 8, 12' moldboard, scarifier, cab, leaning front wheels  
Dragline Bucket, New  
Erie 3/4 yd.

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Late model, used only 700 hours; Caterpillar Diesel D-4400 engine, fully equipped with three sizes of buckets and side cutters. Sacrifice...\$8,000

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- 1—Blaw-Knox 1 1/2 yard Material Bucket, used.
- 1—1 1/2 yard Shovel Front, Model 700 "P&H", used.
- 1—Bare Shovel Boom, Model 693 "P&H", new.
- 1—Set Slicks, Model 655 "P&H" Shovel, new.
- 1—Set 33" Manganese Track Shoes, Model 855 "P&H", new.
- 1—Set Drum Laggings, Model 655 "P&H", new.
- 1—Drum Shaft, complete, with Laggings, Bearing & Drive Gear, Model 362 "Marion", new.
- 1—Swing Shaft & Housing, complete, Model 362 "Marion", new.
- 1—Bull Gear, Model 362 "Marion", new.
- 1—All steel 10-ton Stiff Leg Derrick with 50' Boom, used.
- 1—3-Drum Hoist, Electric, with 40 HP, AC Motor, used.

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## SHOVEL, CRANE & CLAMSHELL

1—BUCYRUS-ERIE, Model 20B, Combination Shovel, Crane and Clamshell, 35' Boom, powered with a Caterpillar D 4600 Diesel Engine, Serial No. 15203. In excellent condition and ready to go to work.

1—BUCYRUS-ERIE, Model 10B, Combination Shovel, Crane and Clamshell, Powered with a Buda Gasoline Engine. Excellent condition and ready to go to work.

## FURNIVAL MACHINERY CO.

54th & Lancaster Ave., Phila. 31, Pa.

## FOR SALE

225 HP Busch Sulzer 150 KW diesel engine generator set.

30 ton American steel stiffleg derrick. 100 foot boom.

1 1/2 yard Bucyrus Erie 33B crane-dragline. Caterpillar engine, 65 foot boom.

35 ton Ohio locomotive crane. Gas powered. Built 1943.

150 HP portable firebox boiler. ASME Code. 250 lb. steam pressure.

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## FOR SALE

Item Description	Price
1 Bay City 1/2 c.y. Model 25 Crane Boom, Shovel & Hoe.....	\$10,000.00
2 Sets of Sheepfoot Rollers	
3 drum.....	ea. 850.00
1 Parsons Trencher, Diesel.....	11,800.00
1 D-8 Tractor/Bulldozer Serial #1H5727 with J Scraper.....	8,900.00

## FOR RENT

2 sets Sheepfoot Rollers—1, 2 and 3 Drum  
1 Parsons Trencher—Diesel

## GEORGE E. DUTEAU

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## PAVERS

2—REX Model 34E Dual Drum Pavers. Model Duomatic, Powered with 6 Cylinder Gasoline Engine, Rex Mechanical Man, Batchmeter, 35' distributing Boom. Serial Nos. GG-165 and GG-126.

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## Miniature DUST MASK

Keeps dust out of nose. Handy as pair of glasses. 9 sq. in. filter. Weighs only 1 oz. Order Today!

Only \$1.00 p.p.

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## Reconditioned Equipment

Caterpillar No. 66 double frame pull grader.  
Buffalo-Springfield Roller, 5 to 6 ton Tandem Roller.

1—New Buda 8 cyl. Diesel Engine, Maximum 194 H.P. Regular Price \$7,600.00; Special Price, \$5,000.00.

D9900, D7700, D6400 and D4600 Caterpillar Power Units.

Model X LeTourneau Scraper (3 1/2-4 Yard).

Day 9 x 16 Rock Crusher on 4 steel wheels.

Athey PD-10 15-ton side dump trailers (for use with DW-10 tractors).

Hobart Electric Welder 300 AMP on four 600 x 16 tires.

Jaques Posthole Digger on two pneumatics 9" x 36".

Miscellaneous Caterpillar Diesel Tractors, Scrapers, Concrete Mixers and other equipment available for rent or sale.

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### Plain and Fabricated

Stocks cover complete range for all building purposes and highway bridge work. Angles, Channels, Standard & Wide Flange Beams 6" to 16"—Lengths 40' to 60' 0".

#### Special Items

50 tons 18"	— 54.7 lb.	beams 40' — 48'
25 " 20"	— 65.4 lb.	" 40' — 50'
25 " 21"	— 62 lb.	" 50' — 60'
50 " 24"	— 78 lb.	" 50' — 60'
25 " 27"	— 94 lb.	" 50' — 60'
25 " 30"	— 108 lb.	" 60' 0"

#### Rails ASCE Section

15 lb.	— 20 lb.	— 25 lb.	— 30 lb.	— 44 lb.
50 lb.	— 60 lb.	— 70 lb.		

#### Ship Channels

6"	— 12 lb.	— 15.3 lb.	— 18 lb.	— 15.1 lb.	— 16.3 lb.
8"	— 18.7 lb.	— 22.8 lb.			
9"	— 25.4 lb.				
10"	— 21.9 lb.	— 25.3 lb.	— 41.1 lb.		
12"	— 32.9 lb.	— 40 lb.			
13"	— 31.8 lb.				
18"	— 42.7 lb.	— 45.8 lb.	— 58 lb.		

Lengths 40' to 60'

### Your Steel Inquiries Solicited

## PENNA. STEEL PRODUCTS

906 CITY CENTRE BLDG.  
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International TD 14 tractor with Bucyrus-Erie hydraulic angle bulldozer. Good condition.

Would take a Low Boy in on trade.

Price \$5,250.00 f.o.b., Morris, Illinois.

## S. S. VILAND

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One Koehring 34-E Dual Drum Power, Waukesha Engine, 35 boom, bucket, complete ready to run.

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Lima, Model 34, 3/4 yd. crane, 40' boom, fairleads, 3/4 yd. Hendrix Drag Bucket. Gasoline motor. Lighting system. Long crawlers, 30' shoes. Excellent Condition. 3 years old.

Bay City, Model 45, 3/4 yd. Gasoline. Counterweight. Wide crawlers. New Shovel Front. 40' crane boom with Rudomatic Tagline Winder. 1 yd. Hendrix Drag Bucket. Also Back Hose. One year old, used about 6 months. Will sell with one attachment or all.

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Like new, 6,300 hours actual use, \$2,500; Byers Bear Cat, Jr., 3/8 yd. shovel with both shovel and dragline booms and 3/8 yd. Dodge dragline bucket, equipped with trailer, \$3,500; 3/4 ton 1942 Dodge 4x4 Carry-all, approximately 30,000 miles, 6 good tires, \$700. Write:

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with Cummins Motor and all electric control. Tires on Tractor 14:00 x 32, tires on Crane 16:00 x 20:00. 7 1/2 ton lifting and traveling capacity. New in August, 1948, less than 250 hours on meter.

Excellent condition  
Cost new \$16,180.00

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2 1/2 T Brockway Tractor & 10 Ton capacity flatbed semi-trailer. Rubber like new. Cheap price.

Athey Mobiloader on Cat. D-8 Postwar 8R series less than 1000 hrs. operation. Priced to sell.

Traxcavator on D-7 Cat, Flat treads. 2 1/2 yd. bucket. Less than 1000 hrs. operation. Priced to sell.

IHC TD-18 Tractor equipped with Isaacson Hydraulic dozer. 1947 Model. Excellent condition.

All types construction equipment for Rent.

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- 1-Lidgerwood Three-Drum Hoist, 7 1/4" x 10", #45729, with Boiler.
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- 1-Chicago Pneumatic Portable Air Compressor, 6 Cyl. Hercules Engine, Serial #321091, Size 9 3/4 x 8 1/2, 315 c.f. capacity, #28947.
- 1-Worthington Boiler Feed Pump, 2", Serial #940714.
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LeTourneau 12 yd. scoop  
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"Caterpillar" Diesel 50 and dozer  
2-Allis-Chalmers Model L tractors  
Allis-Chalmers HD7 and dozer, 1,000 hrs.  
Allis-Chalmers—HD 10 tractor and dozer, 500 hrs.  
Bay City shovel, cheap  
Buckeye dragline  
Pile driver  
Adams grader, 8' blade

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MODEL 79  
CAPACITY—1 1/2 CU. YDS.

If you are looking for a shovel that has been taken care of—one ready to go to work without additional expense, see this machine "on the job" in Metropolitan New York Area.

It has a Caterpillar D13000 Diesel Engine. Equipped with two drums for use as clamshell excavator.

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ONE—CATERPILLAR DIESEL D2 50-INCH GAUGE TRACTOR, with special arrangement for mounting, and on which is mounted—HIGHWAY EQUIPMENT MODEL HD EARTHBORING MACHINE. Complete outfit used 685 hours. Good as new.

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Universal, portable 9 x 36 with set of rolls, crushing plant complete, \$5,800.

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Cement block machines. Will sell cheap.

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HD-10W with Hydraulic Angle Blade—G. M. Diesel New 1948. Guaranteed Excellent Condition.

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International TD-14 Diesel Tractors  
Like New—Attractive Price  
Tarpaulins New Army Surplus 14x14  
\$22.95. Used less than 100 hrs.

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Weight—21,540 in line—4 cyl. Diesel  
Displacement—460.7 cu. in.  
Brake Horsepower—68.5  
Thread Center to Center—74"  
Track Width—16"  
Ground Clearance—9 7/8"  
Ignition type—Compression  
Maximum Lifting Capacity 4000 lbs.  
at 12' radius  
Boom Traverse 260°  
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Also 2—D7 Caterpillar Tractors

Prices on Request—  
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3—TOURNAPULL Super C  
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Wagon. Has all new tires  
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\$25,000 takes all 3 units.  
Must be seen to appreciate.

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Mounted on army 6x6 1/2 cab; new Factory  
Guarantee. Price \$6,500.  
Complete as Crane; 25 ft. Boom including Fairlead.  
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- Above equipment has crushed approx. 75,000 yds. Will sell as one complete unit or separately.  
Numerous other items of used equipment, including trucks and all types of quarry equipment.

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- 4 inch Rex pump—Ingersoll Diesel compressor Model HK-210.
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All Equipment in excellent Condition

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- "Caterpillar" 66 Grader, Serial No. 60655; 12-ft. Blade; excellent condition; f.o.b. Amarillo...\$650.00  
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STEAM ENGINE-DRIVEN BLOWERS  
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- 2—McCoy Rock Dozers for D8 Tractors.
- 1—Pioneer 4' x 10' scalping screen.
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- These 4 trucks are in good running condition and have worked all summer. They are priced right, come in and look them over.

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Various size pumps, gas engines, rotary scrapers, and slip scrapers.

Model 1 Buckeye Ditcher.

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2-TIS Browning Truck Cranes, 15 ton capacity, 90 foot boom on each. 7 1/2 KW generator on one with 39" ring magnet. Excellent Condition. Available Now.  
2-Industrial 30 Ton Locomotive Cranes, 1 Available for Immediate Delivery. Equipped for Magnet Operation.

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1—Littleford Model 155 Trail-O-Roller

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Asphalt Distributor, 800 gal. Rosco tank unmounted, with new Wisconsin Engine, new Roper pump, and Cartwright spray bar .....\$2,300.00

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Cedarapids portable crushing plant.....\$15,000.00

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Lorain Model 55 Dragline, 1 cu. yd. S/N 5027 .....\$7,500.00

Lorain Truck Crane, Model MC-414, Waukesha gas engine, 80' boom, 15' jib, S/N 15447 .....\$18,000.00

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P&H Electric Welder, 300 Amp., trailer mtd. ....\$800.00

Subject to Prior Sale

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American Stiff Leg Derrick capacity 100 tons, maximum reach 80 ft. 125 ft. boom hoist, 4 drum electric air controls power by Westinghouse 100 H.P. Induction motor 60 cycle 3 phase 440 volts. Price \$30,000.

1# Gantry Crane, Mfd. by Marion Shovel Co., never used. 50 tons capacity at 45 ft., radius 28 ft., span 65 ft. high, all electric. Is very heavily constructed and has never been erected. Cost \$80,000 can be had for \$40,000.

1# Northwest model 8, mounted on model 95 base. 2 1/2 cu. yd. crane, 40 tons, 80 ft. boom. Fairleads serial No. 6815, price \$30,000.

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D7 Caterpillar, Serial #7M3257, straight bulldozer blade, completely rebuilt, new tracks and rollers. D7 Caterpillar, Serial #3T1642, cable operated, angle-dozzer.

D7 Caterpillar, Serial #6T1005, cable operated bulldozer blade.

D7 Caterpillar, Serial #3T774, straight bulldozer blade, completely rebuilt and motor thoroughly overhauled, equal to a new machine.

Model 35 Cletrac, unused, no blade, in excellent condition.

DDH Cletrac Tractor, hydraulic angle-dozzer, Serial #1L6300, completely rebuilt from top to bottom.

37B Bucyrus-Erie Shovel, 1-1/4 yard, diesel engine, has been rebuilt and is in excellent condition. Necessary attachments available to convert into dragline.

Model 25 Bay City, Serial #2089, 1/4 yard, excellent condition, new Buda Diesel Engine.

Osgood Serial #2942, 1-1/4 yd. shovel and dragline. Has been completely rebuilt and will guarantee.

Model 83 Byers, Serial #848, 3/4 yard shovel, good condition.

200 Osgood Shovel, Serial #3137, 1/4 yard, will sell as shovel or shovel and backhoe combination.

All above equipment is in first class condition

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2—Standard "C" Tournapulls  
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6 Super Super C Tournapulls  
Bucyrus 16B Crane, completely re-  
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Erie Strayer Portable Concrete Plant  
All sizes of power units and engines.

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International TD-9 tractor with Bucyrus Erie  
dozer shovel attachment, 2 yrs. old. Very  
good condition..... Reasonable

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20 x 36 Universal Jaw Crusher, late model,  
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2018 DAVENPORT ROAD S.E.  
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HD-19 Allis-Chalmers Tractor, Gar Wood Angle Dozer.  
Used 400 hrs. Bargain.  
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D-6 "Caterpillar" with dozer and Winch. Used 800 hrs.

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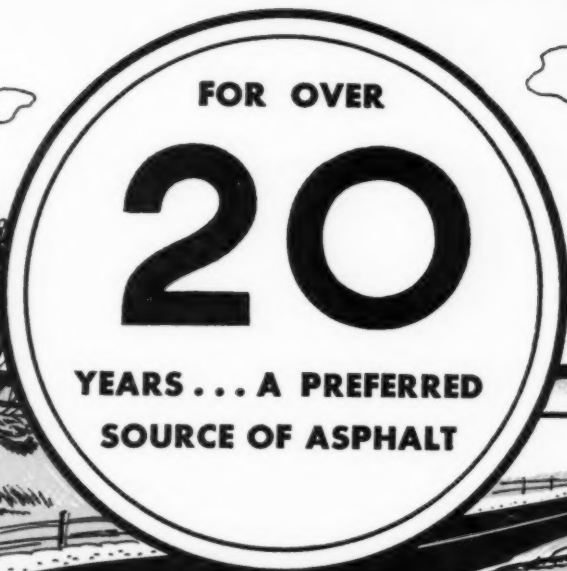
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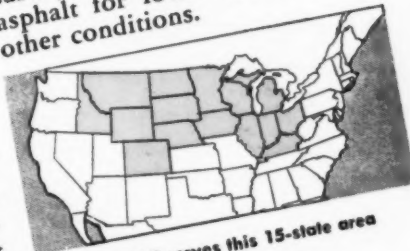
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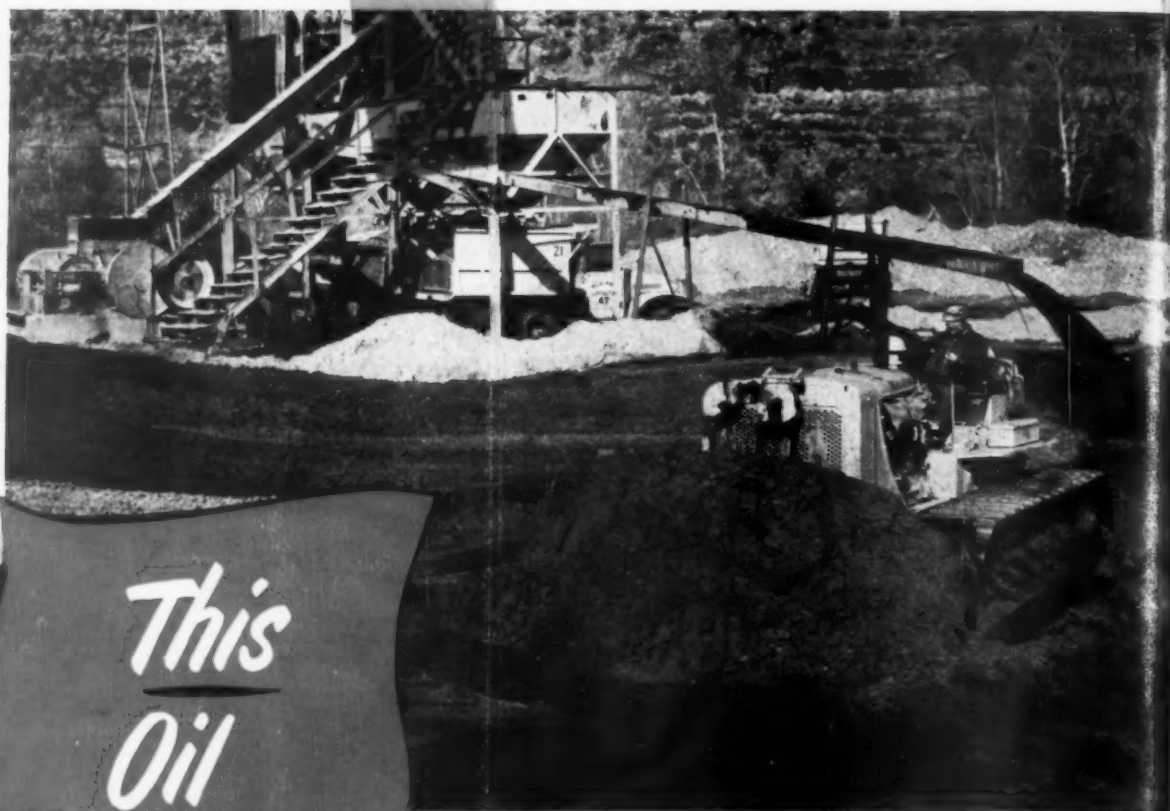
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